Mining Almanack,

1850.

UNDER THE SANCTION AND PATRONAGE OF

HIS ROYAL HIGHNESS PRINCE ALBERT,

Lord Warden of the Stannaries, Chief Steward of the Duchy of Cornwall and Devon, &c. &c.

THE MINING ALMANACK

For 1850,

BEING A YEARLY COMPENDIUM

OF

INFORMATION ON GENERAL SCIENCE,

WITH

TABULAR AND OTHER STATISTICAL DETAILS

RELATING TO

The Mining Interests.

COMPILED AND ARRANGED BY

HENRY ENGLISH, Mining Engineer,

Editor of the "Mining Journal," &c. &c.

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TO

HIS ROYAL HIGHNESS PRINCE ALBERT,

LORD WARDEN OF THE STANNARIES,

Chief Steward of the Duchy of Cornwall and Devon, &c. &c.

MAY IT PLEASE YOUR ROYAL HIGHNESS,

THE august sanction and patronage bestowed by your Royal Highness on the first publication of the MINING ALMANACK, while it evinces a desire on the part of your Royal Highness to patronize and uphold the mining enterprise of this country, has, I am proud to say, elicited from parties engaged in mining pursuits an equally laudable desire to promote the mineral interests of the United Kingdom.

The tabular matter embodied in the present volume is one of the surest guidances to the objects which its publication has in view—that of conveying to the practical miner those views and opinions which may have been deemed theoretical, but which, when well consulted, will be best understood as adding to our national wealth, and displaying our enterprise and perseverance. That science should be further manifested and developed, no doubt can exist, and it is to your Royal Highness that we look for support, fostered as such is by the labours and exertions of the Museum of Practical Geology, under the supervision of Sir H. De la Beche, which, it is to

be hoped, will render us not only more efficient, but be of benefit to our own nation, and to the world in general.

The evidence afforded by your Royal Highness, in emanating and supporting the Exhibition of Industry of all Nations for 1851, is in itself internal testimony of your desire to promote the interests of the country with which you are so intimately allied by the greatest of all ties—as consort of our illustrious and well-beloved sovereign,—and thus, by your exalted position, so ably calculated to aid in the development of the useful sciences, which have rendered this country the first of nations, and which have justly endeared your Royal Highness to the hearts of Englishmen, as the promoter and patron of those objects.

The condescension on the part of your Royal Highness in affording your patronage to the present work, allows me to convey to you my grateful thanks and acknowledgments for the benefits conferred by you on the scientific and operative world.

I have the honour,

With every grateful feeling and respect,

To subscribe myself,

Your Royal Highness's

Most obedient, humble servant,

HENRY ENGLISH.

25, Fleet Street,
29th May, 1850.

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IN addition to the CALENDAR, LISTS of SCIENTIFIC BODIES, and much valuable TABULAR and STATISTICAL MATTER, together with the DIRECTORY for that year, will be found the following

ORIGINAL PAPERS.

Jurisdiction and Practice of the Stannaries Courts. By H. S. Stokes, Esq.
On the Utility of a Knowledge of Engineering, &c. By P. N. Johnson, Esq., F.R.S., F.G.S., &c.
On the Economy of Mining in Cornwall. By James Sims, M.E.
On the Application of Geological Science. By T. Sopwith, Esq., F.R.S., &c.
On the Duties and Acquirements of Engineers. By E. Hopkins, C.E., F.G.S.
On the Newcastle and Durham Coal Fields. By M. Dunn, Esq., M.E.
On the Custom of Tin Bounds. By E. Smirke, Esq.
Societies for the Improvement of the Working Miner and Collier. By the Editor.
Records of Ancient Mining. By J. Y. Watson, Esq., F.G.S.
Rise and Progress of the Cornish Steam Engine. By James Sims, M.E.
On the Structure of the Crystalline Rocks. By E. Hopkins, C.E., F.G.S.
On Applying Atmospheric Exhaustion to Mining and Engineering Works. By T. Clark, C.E.
Benevolent Institutions connected with Mining Industry. By the Editor.
On the Superficial Production of Gold, Oxide of Tin, &c. By E. Hopkins, C.E., F.G.S.
On the Utility of a Knowledge of Assaying and Analysis in the Treatment of Metallic Ores in the Smelting Process. By P. N. Johnson, F.R.S., F.G.S., &c.
Explosions of Fire-Damp connected with Falls in the Barometer. By Professor D. T. Ansted, &c.
On the General Character of the Crystalline Rocks called "Primary." By E. Hopkins, C.E., F.G.S.
On Tin Ores and Black Tin. By P. N. Johnson, F.R.S., F.G.S., &c.
On Gold Deposits and Washings. By José E. Cliffe, M.D., F.G.S.
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Process of Carbonizing Turf without Close Vessels. By Dominique Albert, LL.D.
The Cost-Book System. By the Editor.
The Mineral Topography of Great Britain. By A. W. Tooke, M.A., F.G.S., &c.
Mineralogy. By George Abbot, Esq.
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  Life of James Watt. By the Editor.
  Life of Richard Trevithick, C.E. By Hyde Clarke, Esq.
  Life of George Stephenson, C.E. By Hyde Clarke, Esq.
  Berzelius.
Rules and Regulations for Working the Gales, &c. in the Forest of Dean.
On the Laws and Customs relating to Mining, and the Decisions thereon. By the Editor.
Abstract of an Act for the Registration, Incorporation, and Regulation of Joint-Stock Companies.
Abstract of an Act for the Winding-up of Joint-Stock Companies.
Miscellanea.
Glossary of Mining Terms.

Mining Almanack.

1850.

PART I.

January was placed as leader of the months by Numa Pompilius when he added two months (January and February) to the Alban calendar, though it was not admitted to the same precedence in this country until a motion was made to that effect on the 18th March, 1750. The name is derived from Janus, the god of the year in the Roman mythology, to whom the day was sacred. They sacrificed to him on the 9th day, to Jove on the 13th and 31st. Janus presided over gates and avenues; thus, symbolically, he admitted the new year, and attended the departure of the old. The idol was placed over the gate of a temple at Rome, represented with two faces; the one that of an old man, typical of his retrospect of the past, and the other a youthful countenance, denoting prospect of the future.

Ticketings, Pay Days, &c.

1. T. North Pool account on the Mine.
2. W. Devon Consols and other Mines Sampling.
3. Th. Ticketing at Redruth, N. Roskear, N. Pool, Seton, &c.
4. F. Carn Brea, E. Pool, and S. Basset pay. County Court, Truro.
5. S. Devon Consols, West Jewel, Dolcoath, Stray Park, and Par Consols pay and setting. County Court, Falmouth.
6. S.
7. M. South Francis account on the Mine. Par Consols Sampling. County Court, Helston.
8. T. County Court, Penzance.
9. W. Consols, United, &c. Sampling. County Court, Redruth.
10. Th. Ticketing at Redruth, Carn Brea, and other Mines.
11. F. North Pool setting. County Court at St. Columb. West Caradon and Gonamena pay.
12. S. East Wheal Crofty pay.
13. S.
14. M. N. Roskear acc. on the Mines. Fowey Consols Sampling.
15. T. Devon Consols account. West Buller account.
16. W. Consols acc. on the Mine. N. Pool, Seton, &c. Sampling.
17. Th. Ticketing at Truro, Devon Consols, and other Mines.
18. F. United Mines account. Budnick pay. Levant Tut pay.
19. S. Agar West Buller, Consols, United, Comfort, Trevisky, Wh. Agar, and Seton pay. Fowey Consols pay and setting.
20. S.
21. M. Trevisky account. Par Consols Sampling.
22. T. West Wheal Seton and East Crofty account on the Mine.
23. W. Carn Brea, &c. Sampling. South Tolgus ac. on the Mine.
24. Th. Ticketing at Truro, Consols, United, and other Mines.
25. F. North Pool pay. East Wheal Crofty setting.
26. S. Tresavean, Trethellan, Grambler, and North Roskear pay. Fowey Consols and Condurrow pay and setting.
27. S.
28. M.
29. T. Tresavean account on the Mine.
30. W. No Sampling Copper Ore this week.
31. Th. Ticketing at Redruth. N. Pool, Seton, and other Mines.

Anniversaries, &c.

1. T. Circumcision. Union of Great Britain and Ireland, 1801. E. Burke born, 1730.
2. W. General Wolfe born, 1727.
3. Th. Cicero born, B.C. 107.
4. F. West Indies discovered, 1492.
5. S. Dividends due. Edward the Confessor died, 1066. Duke of York died, 1827.
6. S. EPIPHANY. Twelfth day. Joan of Arc born, 1402. Metastasio born, 1698.
7. M. Allan Ramsay died, 1763. Fire Insurance expires.
8. T. Sun rises at 8, sets at 4. Cape of Good Hope taken, 1806.
9. W. Fontenelle died, 1757. Severe frost, 1814.
10. Th. Royal Exchange burnt, 1838.
11. F. Sir Hans Sloane died, 1752. Roubilliac died, 1762. Linnæus died, 1778. Hilary Term begins.
12. S. Lavater died, 1801.
13. S. FIRST SUNDAY AFTER EPIPHANY. C. J. Fox born, 1749.
14. M. Cambridge and Oxford Term begins.
15. T. Queen Elizabeth crowned, 1599. Dr. Aikin died, 1747. Cotton first imported into Liverpool, 1785. Library, British Museum founded, 1823.
16. W. Edward Gibbon died, 1794.
17. Th. Franklin born, 1706. Algieri born, 1749.
18. F. Prisca. Old Twelfth Day. Houses of York and Lancaster united, 1486.
19. S. Copernicus born, 1473. Congreve died, 1729. James Watt born, 1736. American independence, 1783.
20. S. SECOND SUNDAY AFTER EPIPHANY. St. Fabian. First English Parliament, 1269. Australia colonized, 1788.
21. M. St. Agnes. Louis XVI. beheaded, 1793.
22. T. St. Vincent. Bacon born, 1561. Washington born, 1732. Byron born, 1788.
23. W. William Pitt died, 1806.
24. Th. Frederick the Great born, 1712.
25. F. Conversion of St. Paul. Burns born, 1759.
26. S. Brazil discovered, 1496. Dr. Jenner died, 1823.
27. S. SEPTUAGESIMA SUNDAY. Mozart born, 1756. Dr. C. Hutton died, 1823.
28. M. Sir F. Drake died, 1596. Peter the Great died, 1725. Admiral Byng shot, 1757. Defeat of the Sikhs at Aliwal.
29. T. George III. died, 1820. First Stone Westminster Bridge laid, 1738.
30. W. King Charles I. martyrdom, 1648.
31. Th. St. Peter Nolasco. Ben Jonson born, 1574. London Docks opened, 1805.

February was made the second month by Numa Pompilius. Its name is derived from *Februa*, a title the Romans gave to the Feralia sacrifices, or feast in honour of the ghosts, held on the 11th day, the Lupercalia, in honour of Pan, the god of hunters and shepherds, on the 15th, and the Terminalia, or feast in honour of Terminus, the guardian of boundaries and landmarks, on the 22nd ; also from *februo*, to purify. This being originally held as the last month of the year, people offered an expiatory sacrifice for their twelve months' sin.

Ticketings, Pay Days, &c.

1. F. Tin Croft, Carn Brea, South Wheal Basset, and East Pool pay and setting.
2. S. Devon Consols, Dolcoath, Stray Park, Par Consols, and West Fowey pay and setting. Vice Warden's Court opens at Truro. Wheal Mary pay.
3. S.
4. M. Fowey Consols Sampling.
5. T. South Wheal Basset account on the Mine.
6. W. Devon Consols, &c. Sampling. County Court, Bodmin.
7. Th. Ticketing at Redruth, Carn Brea, and other Mines. County Court, St. Austell.
8. F. Stray Park acc. N. Pool setting. County Court, Truro. West Caradon and Gonamena pay.
9. S. County Court, Falmouth. Par Consols pay.
10. S.
11. M. Wheal Seton account on the Mine. County Court, Helston. Par Consols Sampling.
12. T. County Court, Penzance. Fowey Consols account.
13. W. Wheal Mary account on the Mine. United, Par, South Caradon, and other Mines Sampling.
14. Th. No ticketing this week. County Court, Redruth.
15. F. Levant and Budnick pay. County Court, St. Columb.
16. S. Trevisky pay. Fowey and Prideaux Wood Mines setting and pay.
17. S.
18. M. Condurrow account on the Mine. Fowey Consols Sampling.
19. T. East Pool account on the Mine.
20. W. North Roskear, North Pool, and other Mines Sampling.
21. Th. Ticketing at Redruth, Devon Consols, and other Mines.
22. F. North Pool pay day. East Wheal Crofty setting.
23. S. Tresavean, Trethellan, Grambler, Wheal Seton, North Roskear, South Wheal Francis, United Mines, Tywarnhayle, Agar, Consols, and Fowey Consols pay. Condurrow pay and setting.
24. S.
25. M. Par Consols Sampling.
26. T. North Pool account on the Mine.
27. W. Carn Brea and other Mines Sampling.
28. Th. Ticketing at Lenderyon's Hotel, Truro. United, &c.

Anniversaries, &c.

1. F. St. Ignatius. St. Bridget. New River begun, 1608.
2. S. Candlemas Day. Purification.
3. 𝕾. SEXAGESIMA SUNDAY. St. Blaze. John of Gaunt died, 1399. Monte Video taken, 1807. Silver fourpenny-pieces issued, 1836.
4. M. Cato died, B.C. 46. Fair held on the Thames, 1814.
5. T. St. Agatha. Sir R. Peel born, 1788. Galvani died, 1799. Regalia of Scotland found, 1818.
6. W. Charles II. died, 1685.
7. Th. Mrs. Radcliffe died, 1823.
8. F. Mary Queen of Scots beheaded, 1587. Butler born, 1612.
9. S. Bank of England established, 1691. New Corn Bill introduced.
10. 𝕾. QUINQUAGESIMA SUNDAY. Shrove Sunday. Queen Victoria married, 1840. Lord Darnley murdered, 1567. Congreve born, 1670.
11. M. Sir William Sidney died, 1553. Descartes died, 1650. Fontenelle born, 1657. University College established, 1826.
12. T. Shrove Tuesday. Lady Jane Grey beheaded, 1554.
13. W. Ash Wednesday. First day of Lent. Revolution, 1688.
14. Th. St. Valentine. Old Candlemas Day. Capt. Cook killed, 1779. Jervis's Victory, 1797. Queen Catherine Howard executed, 1541.
15. F. National debt com. 1500. Sir J. Littleton died, 1590.
16. S. Melancthon born, 1497.
17. 𝕾. FIRST SUNDAY IN LENT. Michael Angelo died, 1564. Moliere died, 1763. Pestalozzi died, 1827.
18. M. Martin Luther died, 1546. Cassini born, 1677.
19. T. Galileo born, 1564. Ceylon taken by the British, 1815.
20. W. Bacon died, 1579. Voltaire born, 1694. Garrick born, 1716.
21. Th. James I. Scotland, assassinated, 1437.
22. F. Ember week. Washington born, 1732.
23. S. Sir Thomas Wyatt beh. 1555. Sir J. Reynolds died, 1792.
24. 𝕾. SECOND SUNDAY IN LENT. St. Matthias. Handel born, 1684. Duke of Cambridge born, 1774. Revolution in Paris, 1848.
25. M. Earl of Essex beh. 1601. Sir Christopher Wren died, 1723.
26. T. Bonaparte left Elba, 1815.
27. W. J. Evelyn died, 1706.
28. Th. Italy invaded by the Saracens, 1012.

March with the ancients ranked the first month of the year. It was named in honour of Mars, the supposed father of the founder of Rome. Our Anglo-Saxon ancestors called it Spring Month, and marriages were seldom solemnized, as they were counted likely to become inharmonious and unhappy. The 15th day, or the *ides* of March, was the *Parricidium*, the day on which Julius Cæsar was murdered in the senate-house by Brutus and Cassius. The same day was also the feast of *Anna Perenna*, the sister of Dido, who fled to Italy to Æneas.

Ticketings, Pay Days, &c.

1. F. Carn Brea, S. Wheal Basset, and E. Pool pay and setting.
2. S. Par Consols, West Wheal Jewel, Dolcoath, and Stray Park pay and setting. Devon Consols and Wheal Mary pay.
3. S.
4. M. S. Wh. Francis acc. on the Mine. Fowey Consols Sampling.
5. T.
6. W. Devon Consols, &c. Sampling. County Court, Bodmin.
7. Th. Ticketing at Pool, North Roskear, North Pool, &c. County Court, St. Austell.
8. F. North Pool setting. County Court, Truro. West Caradon and Gonamena pay.
9. S. County Court, Falmouth. Par Consols and E. Crofty pay.
10. S.
11. M. North Roskear account on the Mine. Par Consols Sampling. County Court, Helston.
12. T. County Court, Penzance.
13. W. Consols, United, and other Mines Sampling.
14. Th. Ticketing at Redruth, Carn Brea, &c. County Court, Redruth.
15. F. Wheal Budnick pay. Levant tutwork pay.
16. S. Fowey Consols setting and pay.
17. S.
18. M. Fowey Consols Sampling. Trevisky account.
19. T. East Wheal Crofty accounts on the Mine.
20. W. North Pool, East Wheal Crofty, &c. Sampling. Great Consols account on the Mine.
21. Th. Ticketing at Truro, Devon Consols, and other Mines.
22. F. North Pool pay. United Mines account.
23. S. Seton, Trevisky, Consols, United, Wheal Comfort, Tywarnhayle, and Fowey Consols Mines pay. W. Buller and Agar.
24. S.
25. M. Par Consols Sampling.
26. T. Tresavean account on the Mine.
27. W. Carn Brea and other Mines Sampling.
28. Th. Ticketing at Truro, Consols, United, and other Mines.
29. F. East Crofty setting. Tin Croft pay.
30. S. Tresavean, Trethellan, South Francis, Grambler, West Seton, North Roskear, and Wheal Mary Mines pay. Condurrow pay and setting.
31. S.

Anniversaries, &c.

1\. F. St. David.
2\. S. St. Chad. Gesner died, 1788. Wesley died, 1791.
3\. S. THIRD SUNDAY IN LENT. Sir W. Davenant born, 1606. Otway born, 1651. Prince Charles Stuart died, 1788.
4\. M. Saladin died, 1193.
5\. T. Corregio died, 1534. Dr. Arne, 1778. La Place died, 1827.
6\. W. Michael Angelo born, 1474. Dr. Parr died, 1825.
7\. Th. Perpetua. Bank of England suspended payment, 1790.
8\. F. William III. died, 1702; succeeded by Queen Anne.
9\. S. Rizzio assassinated, 1566. First issue of £1 notes, 1797.
10\. S. FOURTH SUNDAY IN LENT. Playfair born, 1749. Benjamin West died, 1820. Reform Bill introduced, 1831.
11\. M. Tasso born, 1544.
12\. T. St. Gregory. Chelsea Hospital founded, 1682.
13\. W. Georgium Sidus disc. 1781. Napoleon outlawed, 1815.
14\. Th. Admiral Byng shot, 1757.
15\. F. Julius Cæsar assassinated, B.C. 44. London Bridge commenced, 1824.
16\. S. First return of Columbus from America, 1493. Boileau born, 1635. Battle of Culloden, 1746. Gustavus III. assassinated, 1792.
17\. S. FIFTH SUNDAY IN LENT. St. Patrick's Day. Massinger died, 1640. Bishop Burnet died, 1715.
18\. M. Princess Louisa Caroline born, 1848. Edward, Saxon King, stabbed by Elfreda, 979. Sterne died, 1768. Horne Tooke died, 1812.
19\. T. Le Brun born, 1739.
20\. W. Sir I. Newton d. 1727. Ovid b. B.C. 43. Hen. IV. d. 1413.
21\. Th. Benedict. Archbishop Cranmer burnt, 1556.
22\. F. Cambridge Term ends. Trial of Lord Strafford, 1641.
23\. S. Kotzebue assassinated, 1819. Weber died, 1829. National Gallery founded, 1824.
24\. S. PALM SUNDAY. Oxford Term ends. Queen Elizabeth died, 1603. Chesterfield died, 1773.
25\. M. Lady Day. Feast of Annunciation. London Charity Schools established, 1688. Duchess of Cambridge born, 1797.
26\. T. Vanburgh died, 1726. Hutton died, 1797.
27\. W. Robert Bruce crowned, 1306. Columbus discovered St. Domingo, 1492. King James I. died, 1625. Peace of Amiens, 1802.
28\. Th. Maunday Thursday. Gunpowder first used in Europe, 1380.
29\. F. Good Friday. Test Act passed, 1678. Swedenborg died, 1772.
30\. S. Sicilian Vespers, 1282. Dr. Hunter died, 1783.
31\. S. EASTER SUNDAY. Descartes born, 1596. Haydn born, 1732. Allied Sovereigns entered Paris, 1814.

By the Saxons called *Ostremonth.* The Dutch and Germans called it *Grasmonath.* Its name is derived from the Latin *aperio,* to open or disclose: the unfolding of buds and flowers by the influence of the genial warmth and moisture of spring.

Ticketings, Pay Days, &c.

1. M. Fowey Consols Sampling.
2. T. South Wheal Basset account on the Mine.
3. W. Devon Consols and other Mines Sampling.
4. Th. Ticketing at Pool, North Pool, Seton, and other Mines.
5. F. Carn Brea, South Basset, and East Pool pay and setting.
6. S. Par Consols, West Jewel, Dolcoath, and Stray Park pay and setting.
7. S.
8. M. Wheal Seton account on the Mine. Par Consols Sampling. County Court, Helston.
9. T. County Court, Penzance.
10. W. Wheal Mary account on the Mine. United, Par, and South Caradon Sampling.
11. Th. Ticketing at Redruth, Carn Brea, and other Mines. County Court, Redruth.
12. F. Stray Park account. North Pool setting. West Caradon and Gonamena pay.
13. S. Par Consols pay.
14. S.
15. M. Condurrow account on the Mine. Fowey Consols Sampling.
16. T. East Pool account on the Mine.
17. W. North Roskear, North Pool, Seton, and other Mines Sampling.
18. Th. Ticketing at Redruth, Devon Consols, and other Mines.
19. F. Budnick pay. Levant tutwork pay.
20. S. Wheal Seton and Trevisky pay. Fowey Consols setting and pay. Consols, United, Comfort, Agar, and West Buller.
21. S.
22. M. Par Consols Sampling.
23. T.
24. W. Carn Brea and other Mines Sampling.
25. Th. Ticketing at Redruth, United, Par, South Caradon, and other Mines.
26. F. Tin Croft and N. Pool pay day. E. Wheal Crofty setting.
27. S. Tresavean, Trethellan, Fowey Consols, Trevisky, Tywarnhayle, and Wheal Mary pay. Condurrow pay and setting. West Seton, N. Roskear, S. Francis. Levant tribute pay. Vice-Warden's Court, Truro.
28. S.
29. M.
30. T. North Pool account on the Mine.

Anniversaries, &c.

1\. M. Easter Monday. Napoleon married Marie Louise, 1810.
2\. T. Battle of Copenhagen, 1801.
3\. W. Napier died, 1617. Bishop Heber died, 1826.
4\. Th. St. Ambrose. Oliver Goldsmith died, 1774.
5\. F. Game certificate expires.
6\. S. Old Lady Day. Socrates born, B.C. 468. Richard Cœur de Lion died, 1199. Albert Durer died, 1528. Napoleon's first abdication.
7\. S. First Sunday after Easter. Money first coined, B.C. 869. Francis Xavier born, 1506. South Sea Bubble commenced, 1720. Fire Insurance expires.
8\. M. Lorenzo de'Medici died, 1492. Bacon died, 1626.
9\. T. Edward IV. died, 1483.
10\. W. Oxford Term ends. Catholic Emancipation Bill passed, 1829.
11\. Th. George Canning born, 1770.
12\. F. America discovered, 1492. Rodney's victory, 1782.
13\. S. Otway died, 1685. Handel died, 1759.
14\. S. Second Sunday after Easter. Battle of Barnet—Warwick died, 1471. Bishop Porteous died, 1809.
15\. M. Easter Term begins.
16\. T. Sir H. Sloane born, 1660. Buffon died, 1788. Fuzeli died, 1825.
17\. W. Franklin died, 1790.
18\. Th. American revolution, 1775.
19\. F. Byron died, 1824. American war, 1775. Opie died, 1807.
20\. S. Spanish Armada defeated, 1657. Lord Lovat executed, 1747.
21\. S. Third Sunday after Easter. Heber born, 1783. Duke of Sussex died, 1843.
22\. M. Henry VII. died, 1509. Cromwell deposed, 1659.
23\. T. St. George's Day. Shakspeare born, 1564; died, 1616. Cervantes died, 1616. Nollekens died, 1823.
24\. W. Sextus V. created Pope, 1583. Defoe died, 1731.
25\. Th. St. Mark's Day. Princess Alice born, 1843. Tasso died, 1595. Oliver Cromwell born, 1599.
26\. F. David Hume born, 1717.
27\. S. Gibbon born, 1737. Bruce (traveller) died, 1794.
28\. S. Fourth Sunday after Easter. Chaucer died, 1434. Mutiny of the Bounty, 1789.
29\. M. C. de St. Pierre died, 1743.
30\. T. Farquhar died, 1707. Battle of Fontenoy, 1745. War with France, 1803. London University commenced, 1827.

The Hebrews named the month of their calendar which is synonymous with this, *Sivan*, from a catholic word signifying to rejoice. The Anglo-Saxons knew it as *Tri Milchi*, because their cows, stimulated by the fresh herbage, were so productive of milk as to enable the proprietors to bring them to the pail three times a day. The Romans offered sacrifices to Bona Dea, or *Maia*, on the 1st day of the month. It has been celebrated from the earliest ages as Nature's birthday, and will long continue its hold upon human affections.

Ticketings, Pay Days, &c.

1. W. No Copper Ore Sampling this week.
2. Th. Ticketing at Camborne, North Roskear, North Pool, and other Mines.
3. F. Carn Brea, South Basset, and East Pool pay.
4. S. Par Consols, West Wheal Jewel, Dolcoath, and Stray Park pay and setting. Devon Consols.
5. S.
6. M. South Francis account on the Mines. Fowey Consols Sampling. County Court at Helston.
7. T. County Court, Penzance.
8. W. Devon Consols and other Mines Sampling. County Court, Redruth.
9. Th. Ticketing at Redruth, Carn Brea, and other Mines.
10. F. North Pool setting. County Court, St. Columb. West Caradon and Gonamena pay.
11. S. Par Consols pay.
12. S.
13. M. Wheal Jewel Annual Meeting in London. North Roskear account on the Mine. Par Consols Sampling.
14. T.
15. W. Consols account on the Mine. Consols, United, &c. Sampling.
16. Th. No Ticketing Copper Ore this week.
17. F. United Mines ac. on Mines. Budnick pay. Levant pay tutwork.
18. S. Consols, United, Comfort, and Wheal Seton pay. Fowey Consols setting and pay. West Buller.
19. S.
20. M. Fowey Consols Sampling. Trevisky account.
21. T. East Crofty account.
22. W. North Pool and other Mines Sampling.
23. Th. Ticketing at Truro, Devon Consols, and other Mines.
24. F. North Pool pay.
25. S. Fowey Consols and Trevisky pay. Agar, West Seton, Tywarnhayle.
26. S.
27. M. Par Consols Sampling.
28. T. Tresavean account on the Mine.
29. W. Carn Brea and other Mines Sampling.
30. Th. Ticketing at Truro, Consols, United, and other Mines.
31. F. Carn Brea pay. East Crofty setting. Tin Croft pay.

Anniversaries, &c.

1. W. St. Philip and St. James. Addison born, 1672. Dryden died, 1700. England and Scotland united, 1707. Duke of Wellington born, 1769.
2. Th. Leonardo da Vinci died, 1519.
3. F. Machiavelli born, 1469.
4. S. Henry IV. France, killed, 1610. Seringapatam taken, 1799.
5. S. ROGATION SUNDAY. Napoleon died, 1821. Fire at Hamburgh, 1842.
6. M. St. John the Evangelist. Battle of Prague, 1757.
7. T. Glasgow University founded, 1795. Socrates died, B.C. 399.
8. W. Porteous born, 1731. Easter Term ends.
9. Th. Ascension Day. Holy Thursday. Louis XV. died, 1774.
10. F. Battle of Lodi, 1796.
11. S. Earl Chatham died, 1778. Spencer Percival assass. 1812.
12. S. SUNDAY AFTER ASCENSION. Earl Strafford beheaded, 1641.
13. M. Totness great Fair.
14. T. Battle of Tewkesbury, 1471. Vaccination first applied, 1796. Grattan died, 1820.
15. W. Cuvier died, 1832.
16. Th. Sir William Petty born, 1623. Corn Bill passed, 1846.
17. F. Battle of Hexham, 1464. Radcliffe Library founded, 1737. Dr. Jenner born, 1749.
18. S. Siege of Malta raised by Turks, 1566. Napoleon made emperor, 1804. Oxford Term ends.
19. S. WHIT SUNDAY. Pentecost. St. Dunstan. Anne Boleyn beheaded, 1536. Boswell died, 1795.
20. M. Albert Durer born, 1471. Columbus died, 1506. York Minster burnt, 1840.
21. T. Dr. J. Warton died, 1790. First Railway Act passed, 1801.
22. W. Ember week. Landing of King John, 1199. Pope born, 1688. Trinity Term begins.
23. Th. Battle of Ramilies, 1706. First stone of Southwark Bridge laid, 1815. Cambridge Term divides.
24. F. Queen Victoria born, 1819. Linnæus born, 1707.
25. S. Princess Helena born, 1846. Dr. Paley died, 1805.
26. S. TRINITY SUNDAY. St. Augustine. Venerable Bede died, 735. Haydn died, 1809.
27. M. Dante born, 1265. Calvin died, 1564. Crown Prince of Hanover born, 1819.
28. T. Smeeton born, 1724. Pitt born, 1759. Fire at Quebec, 1845.
29. W. Charles II. restored, 1660. Sir Humphrey Davy died, 1829.
30. Th. Rubens died, 1640. Voltaire died, 1778.
31. F. Cruden b. 1700. Pope d. 1744. Eruption of Vesuvius, 1806.

June was the *Thamur* or *Tamuz* of the Hebrews after their escape from the Babylonish captivity. The meaning thereof signifies continuance and perfection; alluding probably to the almost uninterrupted daylight, maturation of fruit, &c.

Ticketings, Pay Days, &c.

1. S. Devon Consols, Mary, Tresavean, Trethellan, Grambler, Wheal Jewel, South Francis, and North Roskear pay. Par Consols and Condurrow pay and setting.
2. S.
3. M. Fowey Consols Sampling.
4. T. South Basset account on the Mine.
5. W. Devon Consols and other Mines Sampling.
6. Th. Ticketing at Camborne, North Pool, and other Mines. County Court, St. Austell.
7. F. South Basset and East Pool pay. County Court, Truro. West Caradon and Gonamena pay.
8. S. Par Consols pay. Dolcoath and Stray Park pay and setting. County Court, Falmouth.
9. S.
10. M. Wheal Seton account on the Mine. Par Consols Sampling.
11. T. County Court, Penzance.
12. W. United, South Caradon, Wheal Mary account, &c.
13. Th. Ticketing at Redruth, Carn Brea, and other Mines.
14. F. Stray Park account. North Pool setting.
15. S. Fowey Consols setting and pay.
16. S.
17. M. Condurrow account on the Mine. Fowey Consols Sampling.
18. T. East Pool and Fowey Consols account on the Mine.
19. W. North Roskear, Consols, North Pool, and other Mines Sampling.
20. Th. Ticketing at Redruth, Devon Consols, and other Mines.
21. F. Budnick pay. Levant tutwork pay.
22. S. Wheal Seton, Trevisky, Agar, Consols, United, Comfort, West Buller, and Fowey Consols pay.
23. S.
24. M. Par Consols Sampling.
25. T.
26. W. Carn Brea and other Mines Sampling.
27. Th. Ticketing at Truro, United, South Caradon, and other Mines.
28. F. Tin Croft and North Pool pay. East Crofty setting.
29. S. Tresavean, Trethellan, Grambler, North Roskear, South Francis, West Seton, Tywarnhayle, and Wheal Mary pay. Condurrow pay and setting. Levant tribute pay.
30. S.

Anniversaries, &c.

1. S. St. Nicomede. Marlow died, 1593. Poussin born, 1594. Lord Howe's victory, 1794.
2. S. FIRST SUNDAY AFTER TRINITY. Riots in London, 1780.
3. M. Globes invented, B.C. 603. Peace signed at Paris, 1814.
4. T. Bishop Boniface. George III. born, 1738.
5. W. Henry II. died, 1189. Corneille born, 1606. A. Smith born, 1723. King of Hanover born, 1771.
6. Th. Calvin born, 1509. Ariosto died, 1553. Lord Anson died, 1762.
7. F. Corpus Christi Day, 1376. Royal Exchange founded, 1566. Reform Bill passed, 1832.
8. S. Bishops sent to the Tower, 1688.
9. S. SECOND SUNDAY AFTER TRINITY. Edward the Black Prince died, 1376. Habeas Corpus Act passed, 1641. Liverpool Old Dock made, 1699.
10. M. London Hospital founded, 1752.
11. T. St. Barnabas. Roger Bacon died, 1294.
12. W. Trinity Term ends. W. Collins died, 1759.
13. Th. Corsica seized by the French, 1769.
14. F. Battle of Marengo, 1800.
15. S. Magna Charta signed, 1215. Wat Tyler killed, 1381. Writings of Luther condemned, 1520. First Stone of London Bridge laid, 1825.
16. S. THIRD SUNDAY AFTER TRINITY. Duke of Marlborough died, 1722.
17. M. St. Alban. The Seven Bishops acquitted, 1788. Wesley born, 1703.
18. T. Battle of Waterloo, 1815. Waterloo Bridge opened, 1817.
19. W. Sir Joshua Banks died, 1820.
20. Th. William IV. died, 1837. Queen Victoria's accession.
21. F. Queen Victoria proclaimed, 1837. King Edward III. died, 1377. Inigo Jones died, 1652. Longest Day. First Stone of St. Paul's laid by Sir Christopher Wren, 1675.
22. S. Battle of Bothwell Brig, 1679. Summer commences.
23. S. FOURTH SUNDAY AFTER TRINITY. Stamp Duty instituted, 1694. Akenside died, 1770.
24. M. Midsummer Day. Nat. of St. John Baptist. John Churchill, Duke of Marlborough, b. 1650. Battle of Bannockburn, 1314.
25. T. St. James.
26. W. Richard III. made king, 1483. George IV. died, 1830.
27. Th. Dr. Dodd hanged for forgery, 1777.
28. F. Queen Victoria crowned, 1838. Rubens born, 1577.
29. S. St. Peter. Julian the Apostate died, 363.
30. S. FIFTH SUNDAY AFTER TRINITY. Greenwich Hospital founded, 1636. Parker hanged at the Nore, 1791.

The fifth month of the Roman calendar: received, in consequence, the name of *Quintilis*, to denote its numerical position. It was sacred to Jupiter, and had, in the Alban calendar, 36 days. Romulus took from it 5, Numa reduced it to 30, but Julius Cæsar enlarged it to 31. In honour of this conqueror, Mark Antony changed its name from *Quintilis* to *Julius*,—hence our July. Our Saxon forefathers, who named their months from certain appearances or events, denominated this *Heymonath*, being their hay harvest.

Ticketings, Pay Days, &c.

1. M. South Francis acc. on the Mine. Fowey Consols Sampling.
2. T. North Pool account on the Mine.
3. W. Devon Consols and other Mines Sampling.
4. Th. Ticketing at Camborne, North Roskear, Consols, North Pool, and other Mines.
5. F. Carn Brea, South Basset, and East Pool pay and setting. County Court, Truro.
6. S. Par Consols, W. Jewel, Dolcoath, Devon Consols and Stray Park pay and setting. County Court, Falmouth.
7. S.
8. M. County Court, Helston. North Roskear account on the Mine. Par Consols Sampling.
9. T. County Court, Penzance.
10. W. Consols, United, &c. Sampling. County Court, Redruth.
11. Th. Ticketing at Redruth, Carn Brea, and other Mines.
12. F. North Pool setting. County Court, St. Columb. West Caradon and Gonamena pay.
13. S. Par Consols pay.
14. S.
15. M. Fowey Consols Sampling.
16. T.
17. W. N. Pool, Seton, &c. Sampling. Gt. Consols ac. on the Mine.
18. Th. Ticketing at Truro, Devon Consols, and other Mines.
19. F. Budnick pay. United Mines account on the Mine.
20. S. Wheal Seton, Trevisky, Great Consols, West Buller, Comfort, Agar, and United Mines pay. Fowey Consols setting and pay.
21. S.
22. M. Trevisky and Barrier account. Par Consols Sampling.
23. T. East Wheal Crofty account on the Mine.
24. W. Carn Brea and other Mines Sampling.
25. Th. Ticketing at Truro, Consols, United, and other Mines.
26. F. North Pool pay. East Crofty setting.
27. S. Tresavean, Trethellan, N. Roskear, Grambler, Fowey Consols, Tywarnhayle, West Seton, and Wheal Mary pay. Condurrow pay and setting.
28. S.
29. M.
30. T. Tresavean and Trethellan accounts on the Mines.
31. W. No Copper Ore Sampling this week.

Anniversaries, &c.

1. M. Battle of the Boyne, 1690.
2. T. Rousseau died, 1778. Hungerford Market opened.
3. W. Dog Days begin. Cranmer born, 1489.
4. Th. St. Martin. Transfiguration. American Independence proc. 1776.
5. F. Dividends due. Cambridge Term ends. Peter the Hermit died, 1115.
6. S. Old Midsummer Day. Oxford and Trinity Terms end. Edward VI. died, 1553. Henry II. died, 1189.
7. 𝔖. SIXTH SUNDAY AFTER TRINITY. Edward I. died, 1307. Sir Thomas More beheaded, 1535. Sheridan d. 1816.
8. M. La Fontaine born, 1621. Burke died, 1797.
9. T. Fire Insurance expires.
10. W. Demosthenes born, B.C. 382. First Bible printed in Scotland, 1579. Sir W. Blackstone born, 1723.
11. Th. D'Anville born, 1697. Lalande born, 1732.
12. F. Julius Cæsar born, B.C. 100. Erasmus died, 1536.
13. S. Napoleon surrended to the *Bellerophon*, 1815.
14. 𝔖. SEVENTH SUNDAY AFTER TRINITY. Bastille destroyed, 1789. Baroness De Staël died, 1817.
15. M. St. Swithin.
16. T. Sir Joshua Reynolds born, 1723. La Voissier born, 1743.
17. W. Dr. Watts born, 1674. A. Smith died, 1790.
18. Th. Sun due west at 5 o'clock.
19. F. Petrarch died, 1374. Spanish Armada arrived, 1588. Bodleian Library founded, 1610.
20. S. St. Margaret. Petrarch born, 1304.
21. 𝔖. EIGHTH SUNDAY AFTER TRINITY. Battle of Shrewsbury, 1403. Lord W. Russell beheaded, 1683. Burns d. 1796.
22. M. St. Mary Magdalene. Battle of Salamanca.
23. T. First English newspaper printed, 1588. Gibraltar taken, 1704.
24. W. Lupus, Bishop of Troyes, 426. Insurances began, 1696.
25. Th. St. James or Apple-blessing Day. Marriage of Philip and Mary, 1554. Duchess of Cambridge born, 1799.
26. F. St. Anne.
27. S. Revolution in Paris, 1830. Almanack Duty repealed, 1834. Bank of England chartered, 1694.
28. 𝔖. NINTH SUNDAY AFTER TRINITY. Siege of Derry ended, 1689. Robespierre guillotined, 1794. Battle of the Pyrenees, 1813.
29. M. St. Martha. Spanish Armada destroyed, 1588.
30. T. Greenwich Hospital founded, 1696. Penn died, 1718.
31. W. Ignatius Loyola, 1556. Thomas Gray died, 1771.

This month derived its name from Augustus, the Roman emperor. It was called *Sextilis*, or the sixth month, in the Alban calendar, and only 28 days assigned to it. Romulus added 2, and Augustus 1; the whole of which have been since retained. The Anglo-Saxons called it *Barnmonath*, this being the period when their barns were commonly filled, or *Woodmonath*, clothing-month, the fields being then clothed with corn; just as the Romans dedicated this month to Ceres, the goddess of harvest, a period of joy and gladness to all nations.

Ticketings, Pay Days, &c.

1. Th. Ticketing at Camborne, North Pool, Seton, &c.
2. F. Carn Brea, South Basset, Tin Croft, and East Pool pay.
3. S. West Jewel and Devon Consols pay. Par Consols, Dolcoath, and Stray Park pay and setting.
4. S.
5. M. Fowey Consols Sampling.
6. T. South Wheal Basset account on the Mine.
7. W. Devon Consols and other Mines Sampling. County Court, Bodmin.
8. Th. Ticketing at Redruth, Carn Brea, and other Mines.
9. F. Stray Park account. North Pool setting. County Court, Truro. West Caradon and Gonamena pay.
10. S. County Court, Falmouth. Par Consols pay.
11. S.
12. M. Wheal Seton account on the Mine. Par Consols Sampling. County Court, Helston.
13. T. County Court, Penzance.
14. W. United, Par, Caradon, and other Mines Sampling. County Court, Redruth.
15. Th. No Copper Ore Ticketing this week.
16. F. Budnick pay. County Court, St. Columb.
17. S. Fowey Consols setting and pay.
18. S.
19. M. Condurrow acc. on the Mine. Fowey Consols Sampling.
20. T. East Pool account on the Mine.
21. W. North Roskear, North Pool, and other Mines Sampling.
22. Th. Ticketing at Redruth, Devon Consols, and other Mines.
23. F. North Pool pay.
24. S. Trevisky, Seton, Tywarnhayle, Consols, United, Comfort, Agar, West Buller, and Fowey Consols pay.
25. S.
26. M. Par Consols Sampling.
27. T. North Pool account on the Mine.
28. W. Carn Brea and other Mines Sampling.
29. Th. Ticketing at Redruth, United, Par, and other Mines.
30. F. East Crofty setting. Tin Croft pay.
31. S. Tresavean, Trethellan, N. Roskear, Grambler, West Seton, and Wheal Mary pay. Condurrow pay and setting. Levant tribute pay.

Anniversaries, &c.

1. Th. Lammas. Queen Anne died, 1714. Regent's Canal opened, 1820. Slavery abolished, 1837. Battle of the Nile, 1798.
2. F. William Rufus slain, 1100. Battle of Blenheim, 1704.
3. S. Columbus's first voyage, 1492. Arkwright died, 1792. Bank of England commenced.
4. S. TENTH SUNDAY AFTER TRINITY. Calais taken by Edward III. 1347. East-India Docks opened.
5. M. Earl Howe died, 1799.
6. T. Transfiguration. Prince Alfred born, 1844. Ben Jonson died, 1637.
7. W. Fenelon born, 1561. Grand eruption of Vesuvius, 1779. Napoleon sailed for St. Helena, 1815. Queen Caroline died, 1821.
8. Th. Canning died, 1827.
9. F. Dryden b. 1631. First mail-coach established, 1785.
10. S. St. Lawrence. Battle of St. Quentin, 1557. Greenwich Observatory founded, 1675.
11. S. ELEVENTH SUNDAY AFTER TRINITY. Dog-days end.
12. M. George IV. born, 1762.
13. T. Old Lammas Day.
14. W. Printing invented, 1441. Thomas Sheridan died, 1785.
15. Th. Assumption Day. Admiral Blake born, 1599. Napoleon born at Ajaccio, 1769. Sir W. Scott born, 1771.
16. F. Andrew Marvel died, 1678.
17. S. Admiral Blake died, 1657. Frederick the Great died, 1786. Duchess of Kent born, 1786.
18. S. TWELFTH SUNDAY AFTER TRINITY. Beattie died, 1803.
19. M. Royal George sunk, 1782.
20. T. Bloomfield died, 1823.
21. W. Muslin first made, 1781.
22. Th. Battle of Bosworth Field, 1485. Oliver Comwell mar. 1620.
23. F. Wallace beheaded, 1305. Duke of Buckingham killed, 1628. Stamps on newspapers, 1713. Cuvier born, 1769. American War, 1775.
24. S. St. Bartholomew. French massacre, 1572.
25. S. THIRTEENTH SUNDAY AFTER TRINITY. Battle of Cressy, 1346. Goethe, 1749. James Watt died, 1819. Sir W. Herschel died, 1822.
26. M. Prince Albert born, 1819. Lopez de Vega died, 1635.
27. T. Liverpool incorporated, 1207. Algiers taken, 1816.
28. W. St. Augustine. Eruption of Vesuvius, 1834.
29. Th. St. John the Baptist beheaded. John Locke born, 1632. Sir W. Congreve died, 1828.
30. F. Jerusalem destroyed, A.D. 70. Paley born, 1743.
31. S. Henry V. died, 1422. Bunyan died, 1688. British Museum closes.

In the Latin and Roman calendar this was the seventh month; *septem*, seven, and *imber*, a shower of rain. It had only 16 days assigned to it in the Alban calendar, increased to 30 by Romulus, to 31 by Julius Cæsar; but Augustus reduced it to 30 again. The ancient Saxons called it *Berstmonath*, or barley month.

Ticketings, Pay Days, &c.

1. S.
2. M. S. Francis acc. on the Mine. Fowey Consols Sampling.
3. T.
4. W. Devon Consols and other Mines Sampling.
5. Th. Ticketing at Pool, N. Roskear, Consols, N. Pool, &c.
6. F. Carn Brea, South Basset, and East Pool pay day. County Court, Truro. West Caradon and Gonamena pay.
7. S. Devon Consols and W. Jewel pay. County Court, Falmouth. Par Consols, Dolcoath, and Stray Park pay and setting.
8. S.
9. M. North Roskear account. Par Consols Sampling. County Court, Helston.
10. T. County Court, Penzance.
11. W. Consols, United, and other Mines Sampling. County Court, Redruth.
12. Th. Ticketing at Redruth, Carn Brea, and other Mines.
13. F. North Pool setting. County Court, St. Columb.
14. S. Par Consols pay.
15. S.
16. M. Trevisky and Barrier account. Fowey Consols Sampling.
17. T.
18. W. Great Consols account on the Mines. North Pool and other Mines Sampling.
19. Th. Ticketing at Truro. Devon Consols and other Mines.
20. F. United Mines account on the Mines. Budnick pay. Levant tutwork pay.
21. S. Consols, United, Seton, and Trevisky pay. Fowey Consols, Comfort, Wost Ruller, and Agar setting and pay.
22. S.
23. M. Par Consols Sampling.
24. T. Tresavean, Trethellan, and East Wheal Crofty account on the Mine.
25. W. Carn Brea and other Mines Sampling.
26. Th. Ticketing at Truro, Consols, United, and other Mines.
27. F. North Pool pay. East Crofty setting. Tin Croft pay.
28. S. Tresavean, Trethellan, N. Roskear, Grambler, Fowey Consols, and Wh. Mary pay. Condurrow, Tywarnhayle, and West Seton pay and setting.
29. S.
30. M.

Anniversaries, &c.

1. S. Fourteenth Sunday after Trinity. Louis XIV. died, 1715. Copenhagen surrendered, 1807. St. Giles.
2. M. Style altered, 1752. London burnt, 1666; fire lasted 3 days, destroyed 87 churches, 13,200 houses, and £10,000,000 property.
3. T. Cromwell, victory at Dunbar; victory at Worcester, 1653; died, 1658. Sir E. Coke died, 1634.
4. W. Home died, 1808.
5. Th. First American Congress, 1774. Malta taken, 1800.
6. F. Rebellion begun, 1715.
7. S. Eunurchus. Queen Elizabeth b. 1533. Buffon b. 1707.
8. S. Fifteenth Sunday after Trinity, Nativity. William the Conqueror died, 1087. Ariosto born, 1474.
9. M. Battle of Flodden Field, 1643. British Museum re-opens, 10 to 4.
10. T. Paper first made in England, 1588. Mungo Park d. 1771.
11. W. Tea first imported, 1391.
12. Th. Siege of Vienna, 1683. Blucher died, 1819.
13. F. General Wolfe died, 1759. Fox died, 1806.
14. S. Holyrood Cross.
15. S. Sixteenth Sunday after Trinity. Liverpool and Manchester Railway opened, 1830.
16. M. Moscow burnt, 1812.
17. T. Lambert. Queen of Portugal installed, 1834. London and Birmingham Railway opened, 1838.
18. W. Ember Week. Dr. Johnson born, 1709. Sterne died, 1768.
19. Th. Battle of Poictiers, 1356. First English book printed, 1471.
20. F. Edward II. murdered, 1327. Battle of Newbury, 1643.
21. S. St. Matthew. Sir W. Scott died, 1832.
22. S. Seventeenth Sunday after Trinity. Charles V. died, 1558. George III. crowned, 1761. New Post Office opened, 1829.
23. M. Butler died, 1680. Autumn Quarter commences; day and night equal.
24. T. Don Pedro died, 1834. Sun rises due east.
25. W. Dr. Adam Clarke died, 1832.
26. Th. St. Cyprian. William II. crowned, 1087. Collingwood born, 1748. Werner born, 1750.
27. F. Fire at Devonport Dockyard, 1840.
28. S. Richard II. resigns, 1399. South Sea Bubble burst, 1720.
29. S. Eighteenth Sunday after Trinity. Michaelmas Day. Nelson born, 1758.
30. M. St. Jerome. Queen Mary crowned, 1553. Whitfield died, 1770.

This, by our Saxon forefathers, was called *Wynmonath*, or wine month, and was the eighth of the Alban calendar, in which it had 39 days. Its name is derived from the Latin *octo*, eight, and *imber*, a shower of rain. Romulus reduced it to 31 days, Numa to 29; Julius and Augustus each added one, and this number continues.

Ticketings, Pay Days, &c.

1. T. South Basset account on the Mine.
2. W. Devon Consols and other Mines Sampling. Treleigh annual meeting in London.
3. Th. Ticketing at Pool, North Pool, Seton, and other Mines. County Court, Bodmin.
4. F. Carn Brea, South Basset, and East Pool pay and setting. County Court, Truro.
5. S. Devon Consols and W. Jewel pay. County Court, Falmouth. Par Consols, Dolcoath, and Stray Park pay and setting.
6. S.
7. M. Wheal Seton account on the Mine. Par Consols Sampling. County Court, Helston.
8. T. County Court, Penzance.
9. W. United, Par, S. Caradon, and other Mines Sampling.
10. Th. Ticketing at Redruth, Carn Brea, and other Mines. County Court, Redruth.
11. F. Stray Park account. North Pool setting. County Court, St. Columb. West Caradon and Gonamena pay.
12. S. Par Consols pay.
13. S.
14. M. Condurrow acc. on the Mine. Fowey Consols Sampling.
15. T. East Pool and Fowey Consols account on the Mine.
16. W. North Roskear, North Pool, and Seton Sampling.
17. Th. Ticketing at Redruth, Devon Consols, and other Mines.
18. F. Budnick pay. Levant tutwork pay.
19. S. Trevisky and Seton pay. Fowey Consols, Great Consols, Agar, West Buller, United, and Comfort setting and pay.
20. S.
21. M. Par Consols Sampling.
22. T.
23. W. Carn Brea and other Mines Sampling.
24. Th. Ticketing at Truro, United Mines, Par, and other Mines.
25. F. North Pool pay. East Crofty setting.
26. S. Tywarnhayle, Tresavean, Trethellan, Grambler, North Roskear, Fowey Consols, Wheal Mary, and Condurrow pay. West Seton and Levant tribute pay.
27. S.
28. M.
29. T. North Pool account on the Mines.
30. W. No Copper Ore Sampling this week.
31. Th. Ticketing at Pool, N. Roskear, N. Pool, Seton, &c.

Anniversaries, &c.

1\. T. Bishop Percy died, 1811. London University opened, 1828.
2\. W. Major André hanged as a spy in New York, 1780.
3\. Th. Barclay died, 1690. Archbishop Tillotson born, 1730. King's College opened, 1831.
4\. F. Bible printed in England, 1535. Bishop Heber died, 1833.
5\. S. Old Parr died, 1635. Walpole born, 1717.
6\. S. NINETEENTH SUNDAY AFTER TRINITY. Louis Philippe born, 1773. Peace proclaimed with America, 1783.
7\. M. William I. of Holland abdicated, 1840.
8\. T. Gun Cotton patented, 1846. Eddystone Lighthouse opened, 1759.
9\. W. St. Denis, patron saint of France.
10\. Th. B. West born, 1738. Oxford and Cambridge Term begins.
11\. F. Old Michaelmas Day. Lord Duncan's victory, 1797.
12\. S. America discovered, 1492.
13\. S. TWENTIETH SUNDAY AFTER TRINITY. Murat shot, 1815. Canova died, 1822.
14\. M. Battle of Hastings, 1066. Penn born, 1644. Battle of Jena, 1806. China Trade opened, 1833.
15\. T. Virgil born, B.C. 70. Fire Insurance expires.
16\. W. Sir P. Sidney died, 1586. Battle of Leipsic, 1813. Marie Antoinette guillotined, 1793. Kosciusko died, 1817.
17\. Th. Etheldreda. Napoleon arrived at St. Helena, 1815.
18\. F. St. Luke. King John died, 1216.
19\. S. Kneller died, 1723. Swift died, 1745.
20\. S. TWENTY-FIRST SUNDAY AFTER TRINITY. Sir Christopher Wren born, 1632. Battle of Navarino, 1827.
21\. M. Smollet died, 1771. Battle of Trafalgar, Nelson d. 1805.
22\. T. Sir Cloudesley Shovell wrecked, 1707.
23\. W. Royal Exchange founded, 1667.
24\. Th. Chaucer died, 1400. Butler, 1680. First British Parliament, 1707.
25\. F. St. Crispin. King Stephen died, 1154. Battle of Agincourt, 1415. George II. died, 1760.
26\. S. Hogarth died, 1764. Riots in Bristol, 1831.
27\. S. TWENTY-SECOND SUNDAY AFTER TRINITY. Capt. Cook born, 1728. Napoleon entered Berlin, 1806.
28\. M. St. Simon and St. Jude. King Alfred died, 901. Erasmus born, 1467. Locke died, 1704.
29\. T. Sir W. Raleigh beheaded, 1618. Sheridan born, 1751.
30\. W. Alfred the Great died, 900. First Stone of Blackfriars Bridge laid, 1760. Tower Armory burnt, 1841.
31\. Th. Hallowmas Eve. Evelyn born, 1620.

The early Saxon inhabitants of England called this *Blottmonath*, or slaughter-month, because in those primitive days winter seed was so scarce in England that it was usual to kill and salt the greater part of their winter meat in this month. Its name is derived from the Latin *novem*, nine, and *imber*, a shower. It was so called in the Alban calendar, and has preserved its name both in our island and on the continent.

Ticketings, Pay Days, &c.

1. F. Carn Brea, South Basset, Tin Croft, and East Pool pay day.
2. S. Par Consols, Stray Park, Dolcoath, Devon Consols, and West Jewel pay and setting.
3. S.
4. M. S. Francis account on the Mine. Fowey Consols Sampling.
5. T.
6. W. Devon Consols and other Mines Sampling. County Court, Bodmin.
7. Th. Ticketing at Redruth, Carn Brea, and other Mines.
8. F. North Pool setting. County Court, Truro. West Caradon and Gonamena pay.
9. S. County Court, Falmouth. Par Consols pay.
10. S.
11. M. County Court, Helston. Par Consols Sampling.
12. T. County Court, Penzance.
13. W. Consols, United, &c. Sampling. County Court, Redruth.
14. Th. No Copper Ore Ticketing this week.
15. F. County Court, St. Columb. Budnick pay. Levant tut-work pay.
16. S. Fowey Consols setting and pay.
17. S.
18. M. Trevisky and Barrier account. Fowey Consols Sampling.
19. T. East Wheal Crofty account on the Mine.
20. W. North Pool, Seton, &c. Sampling. Great Consols account on the Mine.
21. Th. Ticketing at Truro, Devon Consols, and other Mines.
22. F. N. Pool pay. United Mines account on the Mines.
23. S. Consols, United, Fowev Consols, Wheal Seton, Agar, Comfort, West Buller, and Trevisky pay.
24. S.
25. M. Par Consols Sampling.
26. T.
27. W. Carn Brea, &c. Sampling.
28. Th. Ticketing at Truro, Consols, United, &c.
29. F. East Wheal Crofty setting. Tin Croft pay.
30. S. Tresavean, Trethellan, Grambler, Condurrow, Tywarnhayle, West Seton, North Roskear, and Wheal Mary pay.

Anniversaries, &c.

1. F. All Saints. Hallowmas. Earthquake at Lisbon, 1755.
2. S. All Souls. Michaelmas Term begins.
3. S. TWENTY-THIRD SUNDAY AFTER TRINITY. Drake returned from first voyage round the world, 1580. Long Parliament opened, 1641.
4. M. King William landed, 1688. St. Petersburgh Academy of Fine Arts instituted, 1764. Montgomery born, 1771.
5. T. Gunpowder Plot, 1605. Hogarth died, 1764. Churchill died, 1784. Battle of Genappe, 1792.
6. W. Leonard. Princess Charlotte died, 1817.
7. Th. Battle of Prague, 1660. First Newspaper printed at Oxford, 1665.
8. F. Cardinal Ximenes died, 1517. Cortez entered Mexico, 1519. Milton died, 1674.
9. S. Prince of Wales and Duke of Cornwall born, 1841. Lord Mayor's Day.
10. S. TWENTY-FOURTH SUNDAY AFTER TRINITY. Luther born, 1483.
11. M. St. Martin.
12. T. Cambridge Term divides. Canute d. 1036. Baxter b. 1615.
13. W. Britius. Curran died, 1817.
14. Th. Academy of Arts established at Rome, 1593. Bruce discovered source of the Nile, 1770.
15. F. Lavater born, 1741. War commenced with America, 1774.
16. S. Henry III. died, 1272. East-India House built, 1786.
17. S. TWENTY-FIFTH SUNDAY AFTER TRINITY. St. Hugh. Le Sage died, 1747. Opening Westminster Bridge, 1750.
18. M. Cape of Good Hope taken, 1497. Wilkie born, 1785.
19. T. Charles I. born, 1599. Blackfriars Bridge opened, 1776.
20. W. Lord Hawke's Victory, 1759.
21. Th. Princess Royal born, 1840.
22. F. St. Cecilia. Committee of Fine Arts issued, 1841.
23. S. St. Clement. Old Martinmas Day.
24. S. TWENTY-SIXTH SUNDAY AFTER TRINITY. Knox died, 1572. Sterne born, 1713. Peace with America, 1814.
25. M. St. Catherine. Michaelmas Term ends. Dr. Watts d. 1748.
26. T. Great Storm, 1703. Cowper born, 1731.
27. W. Post Office established, 1560. Capt. Cook born, 1728.
28. Th. Cardinal Wolsey died, 1530.
29. F. Goldsmith born, 1731. Polish Revolution, 1830.
30. S. St. Andrew's. Swift born, 1667. Sir Christopher Wren, President of the Royal Society, 1681.

So named by the Romans, being the tenth or last month into which they divided the year. It was, by the Saxons, denominated *Wintermonath*, but after Christianity, they piously gave it the name of *Holymonth.*

Ticketings, Pay Days, &c.

1. S.
2. M. Fowey Consols Sampling.
3. T. South Basset account on the Mine.
4. W. Devon Consols, &c. Sampling. County Court, Bodmin.
5. Th. Ticketing at Redruth, North Pool, Seton, &c.
6. F. Carn Brea, South Basset, and East Pool pay and setting. County Court, Truro.
7. S. Par Consols, Dolcoath, Stray Park, Devon Consols, and West Jewel pay and setting. County Court, Falmouth.
8. S.
9. M. Wheal Seton account on the Mine. Par Consols Sampling. County Court, Helston.
10. T. County Court, Penzance.
11. W. United, &c. Sampling. County Court, Redruth. Wheal Mary account on the Mine.
12. Th. Ticketing at Redruth, Carn Brea, and other Mines.
13. F. Stray Park account. North Pool setting. County Court, St. Columb. West Caradon and Gonamena pay.
14. S. Par Consols pay.
15. S.
16. M. Condurrow acc. on the Mine. Fowey Consols Sampling.
17. T. East Pool account on the Mine.
18. W. North Pool and other Mines Sampling.
19. Th. Ticketing at Redruth, Devon Consols, and other Mines.
20. F. Budnick pay. Levant tutwork pay.
21. S. Consols, United, Comfort, and Seton pay. Fowey Consols, Agar, West Buller, and Trevisky setting and pay.
22. S.
23. M. Par Consols Sampling.
24. T. Carn Brea and other Mines Sampling.
25. W. Christmas Day.
26. Th. Ticketing at Redruth, United, and other Mines.
27. F. East Wheal Crofty setting. North Pool pay.
28. S. Condurrow, Wheal Mary, Fowey Consols, Tresavean, Trethellan, West Seton, Levant tribute, North Roskear, and Grambler pay.
29. S.
30. M.
31. T. North Pool account on the Mine.

Anniversaries, &c.

1. S. ADVENT SUNDAY. Henry I. died, 1135. Pope Leo X. died, 1521. Alexander I. died, 1825. Art Union chartered, 1846.
2. M. St. Paul's finished, 1710. Napoleon created emperor, 1804. Battle of Austerlitz, 1805. Queen Adelaide died, 1849.
3. T. James II. abdicated, 1688. Belzoni died, 1823.
4. W. Woollen cloth made, 1331. Cardinal Richelieu died, 1642.
5. Th. Mozart died, 1792.
6. F. Nicholas.
7. S. Sydney beheaded, 1683. Ney shot, 1815.
8. S. SECOND SUNDAY IN ADVENT. Milton born, 1608. Flaxman died, 1826.
9. M. Washington died, 1799.
10. T. Hogarth born, 1697. Royal Academy established, 1768.
11. W. Charles XII. killed, 1718. John Gay died, 1732.
12. Th. Lord Hood born, 1724. Darwin born, 1732. C. Cibber died, 1757.
13. F. S. Johnson died, 1784.
14. S. I. Walton died, 1683. Washington died, 1799.
15. S. THIRD SUNDAY IN ADVENT. Calico introduced into Great Britain, 1772.
16. M. Selden born, 1584. Cromwell declared Protector, 1653. Whitfield born, 1714. Cambridge Term ends.
17. T. Sir H. Davy born, 1778. Oxford Term ends.
18. W. Ember Week. Thos. Guy died, 1724. Bolivar died, 1830.
19. Th. Rubens born, 1577. Riots at Manchester, 1792.
20. F. Thomas Gray born, 1716. War declared against Holland, 1780. Dulwich Gallery founded, 1810.
21. S. St. Thomas. Shortest Day.
22. S. FOURTH SUNDAY IN ADVENT. Banks (Sculptor) b. 1735.
23. M. James II. fled, 1688. Arkwright born, 1732.
24. T. Bishop Warburton born, 1698.
25. W. Christmas Day. Sir I. Newton born, 1642.
26. Th. St. Stephen. French landed in Bantry Bay, 1796.
27. F. St. John Evangelist. Greenwich Railway opened, 1829.
28. S. Innocents. Queen Mary II. died, 1694. Wilkes d. 1797.
29. S. FIRST SUNDAY AFTER CHRISTMAS. Lord Stafford beheaded, 1680. Wycliffe died, 1384.
30. M. Royal Society established. Great Frost on the continent, 1794. Marmontel died, 1799.
31. T. Boerhaave born, 1668.

Days.	JANUARY.				FEBRUARY.				MARCH.			
	SUN		MOON		SUN		MOON		SUN		MOON	
	Rises	Sets.	Rises	Sets.	Rises	Sets.	Rises	Sets.	Rises	Sets.	Rises	Sets.
	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.
1	8 8	4 0	8 9	10 1	7 41	4 48	10 44	9 51	6 48	5 37	9 33	8 16
2	8 8	4 1	9 25	10 35	7 40	4 49	11 53	10 20	6 46	5 39	10 43	8 45
3	8 8	4 2	10 40	11 2	7 38	4 50	Morn	10 42	6 44	5 41	11 51	9 11
4	8 8	4 3	11 50	11 28	7 36	4 52	1 1	11 11	6 42	5 43	Morn	9 40
5	8 8	4 4	Morn	11 53	7 34	4 54	2 5	11 41	6 40	5 45	0 54	10 12
6	8 7	4 6	1 0	Aft.	7 32	4 56	3 8	Aft.	6 38	5 46	1 55	10 50
7	8 7	4 7	2 7	0 40	7 30	4 57	4 5	0 53	6 36	5 48	2 50	11 33
8	8 6	4 8	3 14	1 8	7 29	4 59	4 56	1 37	6 34	5 50	3 39	Aft.
9	8 6	4 9	4 15	1 37	7 27	5 0	5 43	2 28	6 31	5 51	4 22	1 15
10	8 5	4 10	5 15	2 13	7 25	5 2	6 24	3 25	6 28	5 53	5 0	2 14
11	8 5	4 12	6 10	2 54	7 24	5 4	7 0	4 23	6 26	5 55	5 31	3 18
12	8 4	4 14	7 1	3 42	7 22	5 6	7 31	5 29	6 23	5 57	6 0	4 22
13	8 3	4 15	7 46	4 34	7 20	5 8	7 56	6 34	6 21	5 58	6 27	5 29
14	8 2	4 17	8 25	5 32	7 18	5 10	8 22	7 40	6 18	6 0	6 50	6 39
15	8 1	4 19	8 58	6 33	7 16	5 12	8 46	8 50	6 16	6 2	7 13	7 49
16	8 0	4 20	9 28	7 37	7 10	5 14	9 8	9 59	6 13	6 4	7 38	9 0
17	7 59	4 21	9 53	8 42	7 12	5 16	9 33	11 8	6 11	6 6	8 5	11 4
18	7 58	4 23	10 17	9 50	7 11	5 18	10 1	Morn	6 9	6 8	8 34	11 27
19	7 57	4 24	10 39	10 59	7 9	5 19	10 31	0 22	6 7	6 10	9 8	Morn
20	7 56	4 26	11 3	Morn	7 7	5 21	11 9	1 34	6 5	6 11	9 50	0 37
21	7 55	4 28	11 28	0 9	7 5	5 23	11 52	2 45	6 3	6 12	10 41	1 43
22	7 54	4 30	11 59	1 21	7 3	5 25	Aft.	3 51	6 1	6 14	11 41	2 44
23	7 53	4 32	Aft.	2 37	7 1	5 27	1 55	4 50	5 59	6 15	Aft.	3 35
24	7 52	4 33	1 12	3 50	6 59	5 29	3 7	5 40	5 57	6 17	2 3	4 19
25	7 51	4 34	2 4	5 2	6 56	5 30	4 26	6 22	5 54	6 18	3 20	4 54
26	7 50	4 36	3 8	6 7	6 54	5 32	5 44	6 56	5 52	6 20	4 37	5 26
27	7 49	4 38	4 19	7 4	6 52	5 34	7 2	7 28	5 50	6 22	5 54	5 54
28	7 48	4 40	5 38	7 51	6 50	5 36	8 18	7 55	5 48	6 24	7 9	6 19
29	7 46	4 42	6 56	8 26					5 45	6 26	8 23	6 43
30	7 45	4 44	8 16	9 2					5 43	6 28	9 33	7 11
31	7 43	4 46	9 30	9 29					5 41	6 30	10 39	7 38

Days.	APRIL.				MAY.				JUNE.			
	SUN		MOON		SUN		MOON		SUN		MOON	
	Rises	Sets.	Rises	Sets.	Rises	Sets.	Rises	Sets.	Rises	Sets.	Rises	Sets.
	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.
1	5 38	6 31	11 43	8 8	4 35	7 21	—	8 2	3 51	8 4	0 5	9 36
2	5 36	6 33	Morn	8 45	4 33	7 23	0 15	8 53	3 51	8 5	0 34	10 40
3	5 34	6 35	0 41	9 25	4 31	7 24	0 56	9 47	3 50	8 6	0 58	11 44
4	5 32	6 37	1 33	10 11	4 29	7 26	1 33	10 46	3 50	8 7	1 22	Aft.
5	5 29	6 38	2 19	11 4	4 28	7 27	2 3	11 49	3 49	8 8	1 45	2 3
6	5 27	6 40	2 58	Aft.	4 26	7 29	2 30	Aft.	3 48	8 9	2 8	3 13
7	5 24	6 41	3 31	1 2	4 24	7 30	2 55	2 3	3 47	8 10	2 33	4 28
8	5 22	6 43	4 2	2 7	4 22	7 32	3 18	3 12	3 47	8 11	3 1	5 45
9	5 20	6 44	4 27	3 14	4 21	7 33	3 41	4 23	3 46	8 11	3 35	7 2
10	5 18	6 45	4 52	4 23	4 19	7 35	4 7	5 38	3 46	8 12	4 17	8 14
11	5 15	6 46	5 15	5 33	4 17	7 36	4 31	6 54	3 45	8 13	5 10	9 21
12	5 13	6 48	5 40	6 45	4 15	7 38	5 5	8 11	3 45	8 14	6 12	10 16
13	5 11	6 50	6 6	8 0	4 14	7 39	5 42	9 25	3 45	8 15	7 24	11 1
14	5 9	6 52	6 34	9 15	4 12	7 41	6 28	10 32	3 45	8 16	8 40	11 37
15	5 7	6 53	7 7	10 29	4 11	7 42	7 23	11 32	3 44	8 16	9 56	Morn
16	5 5	6 55	7 47	11 38	4 10	7 44	8 28	Morn	3 44	8 16	11 14	0 6
17	5 2	6 57	8 35	Morn	4 8	7 45	9 39	0 20	3 44	8 16	Aft.	0 29
18	5 0	6 59	9 33	0 40	4 6	7 47	10 54	1 2	3 44	8 17	1 40	0 58
19	4 58	7 0	10 39	1 34	4 5	7 48	Aft.	1 35	3 44	8 17	2 51	1 20
20	4 56	7 2	11 51	2 19	4 4	7 49	1 24	2 1	3 44	8 18	3 59	1 46
21	4 55	7 4	Aft.	2 57	4 3	7 50	2 38	2 27	3 44	8 18	5 7	2 10
22	4 53	7 6	2 21	3 27	4 2	7 52	3 49	2 49	3 44	8 19	6 12	2 40
23	4 51	7 8	3 37	3 54	4 0	7 53	5 1	3 14	3 45	8 19	7 11	3 13
24	4 49	7 10	4 51	4 21	3 59	7 55	6 10	3 40	3 45	8 19	8 6	3 53
25	4 47	7 11	6 3	4 46	3 58	7 56	7 17	4 6	3 46	8 19	8 54	4 36
26	4 45	7 13	7 14	5 10	3 57	7 58	8 21	4 38	3 46	8 18	9 34	5 29
27	4 43	7 14	8 23	5 36	3 56	7 59	9 18	5 14	3 46	8 18	10 9	6 26
28	4 41	7 16	9 29	6 6	3 55	8 0	10 10	5 55	3 46	8 18	10 38	7 25
29	4 39	7 17	10 31	6 40	3 54	8 1	10 57	6 42	3 47	8 18	11 4	8 28
30	4 37	7 19	11 25	7 18	3 53	8 2	11 34	7 37	3 47	8 18	11 26	9 33
31					3 52	8 3	Morn	8 35				

Days.	JULY.				AUGUST.				SEPTEMBER.			
	SUN		MOON		SUN		MOON		SUN		MOON	
	Rises	Sets.	Rises	Sets.	Rises	Sets.	Rises	Sets.	Rises	Sets.	Rises	Sets.
	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.
1	3 49	8 18	11 49	10 37	4 25	7 46	11 29	1 1	5 13	6 46	Morn	3 28
2	3 49	8 17	Morn	11 45	4 26	7 44	Morn	2 14	5 15	6 44	0 15	4 26
3	3 50	8 17	0 10	Aft.	4 28	7 42	0 2	3 27	5 16	6 42	1 22	5 16
4	3 51	8 16	0 35	2 5	4 30	7 41	0 43	4 37	5 18	6 40	2 37	5 57
5	3 52	8 16	1 0	3 20	4 31	7 40	1 36	5 43	5 20	6 37	3 56	6 31
6	3 53	8 15	1 30	4 35	4 33	7 38	2 35	6 38	5 21	6 35	5 18	7 1
7	3 54	8 15	2 7	5 49	4 35	7 36	3 46	7 23	5 23	6 32	6 40	7 28
8	3 55	8 14	2 54	7 0	4 36	7 34	5 6	8 2	5 25	6 29	8 0	7 55
9	3 56	8 14	3 50	8 0	4 38	7 32	6 28	8 35	5 26	6 27	9 15	8 19
10	3 57	8 13	5 0	8 52	4 40	7 31	7 49	9 2	5 27	6 25	10 30	8 45
11	3 58	8 13	6 15	9 39	4 41	7 29	9 7	9 28	5 29	6 22	11 41	9 16
12	3 59	8 12	7 35	10 7	4 42	7 27	10 24	9 54	5 31	6 20	Aft.	9 50
13	4 0	8 11	8 56	10 36	4 44	7 25	11 38	10 19	5 32	6 18	1 48	10 29
14	4 1	8 10	10 13	11 2	4 45	7 23	Aft.	10 46	5 33	6 16	2 43	11 14
15	4 2	8 9	11 28	11 26	4 46	7 21	1 55	11 17	5 35	6 14	3 31	Morn
16	4 3	8 8	Aft.	11 52	4 47	7 19	2 57	11 53	5 36	6 12	4 12	0 6
17	4 4	8 7	1 50	Morn	4 49	7 17	3 55	Morn	5 38	6 10	4 47	1 2
18	4 5	8 6	2 58	0 16	4 51	7 15	4 48	0 33	5 40	6 7	5 15	2 2
19	4 6	8 5	4 3	0 44	4 52	7 13	5 32	1 20	5 42	6 5	5 41	3 5
20	4 7	8 4	5 5	1 15	4 53	7 11	6 12	2 12	5 43	6 2	6 5	4 10
21	4 9	8 3	6 0	1 52	4 55	7 9	6 45	3 11	5 45	6 0	6 27	5 16
22	4 10	8 2	6 51	2 34	4 57	7 7	7 12	4 12	5 46	5 58	6 48	6 24
23	4 11	8 0	7 33	3 25	4 59	7 5	7 37	5 15	5 48	5 56	7 11	7 31
24	4 12	7 58	8 10	4 19	5 1	7 3	8 0	6 20	5 49	5 54	7 36	8 42
25	4 14	7 56	8 42	5 17	5 2	7 1	8 23	7 26	5 51	5 52	8 4	9 52
26	4 15	7 54	9 9	6 19	5 3	6 59	8 44	8 33	5 53	5 50	8 37	11 4
27	4 17	7 53	9 32	7 24	5 5	6 57	9 6	9 40	5 55	5 47	9 18	Aft.
28	4 19	7 51	9 54	8 29	5 7	6 55	9 33	10 50	5 56	5 45	10 8	1 20
29	4 21	7 50	10 16	9 34	5 8	6 53	10 2	11 59	5 58	5 43	11 6	2 20
30	4 23	7 49	10 39	10 41	5 10	6 51	10 38	Aft.	5 59	5 41	Morn	3 10
31	4 24	7 47	11 2	11 49	5 12	6 49	11 22	2 21				

Days.	OCTOBER.				NOVEMBER.				DECEMBER.			
	SUN		MOON		SUN		MOON		SUN		MOON	
	Rises	Sets.	Rises	Sets.	Rises	Sets.	Rises	Sets.	Rises	Sets.	Rises	Sets.
	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.
1	6 1	5 40	0 16	3 53	6 56	4 32	3 11	3 54	7 46	3 53	4 42	3 12
2	6 3	5 38	1 32	4 28	6 57	4 31	4 28	4 19	7 48	3 52	5 54	3 39
3	6 5	5 35	2 52	4 59	6 59	4 29	5 43	4 43	7 48	3 52	7 4	4 12
4	6 7	5 32	4 13	5 21	7 0	4 27	6 59	5 9	7 49	3 51	8 9	4 51
5	6 9	5 30	5 31	5 51	7 2	4 25	8 12	5 40	7 51	3 51	9 9	5 35
6	6 10	5 27	6 49	6 18	7 4	4 24	9 21	6 16	7 52	3 51	10 1	6 26
7	6 12	5 25	8 7	6 44	7 6	4 22	10 22	6 57	7 53	3 50	10 44	7 23
8	6 14	5 22	9 21	7 12	7 7	4 22	11 19	7 44	7 54	3 50	11 21	8 22
9	6 16	5 20	10 30	7 45	7 9	4 20	Aft.	8 37	7 56	3 50	11 51	9 25
10	6 17	5 18	11 35	8 22	7 10	4 19	0 47	9 35	7 57	3 49	Aft.	10 30
11	6 19	5 15	Aft.	9 5	7 12	4 17	1 20	10 36	7 58	3 49	0 39	11 34
12	6 20	5 13	1 26	9 55	7 14	4 16	1 48	11 39	7 59	3 49	1 1	Morn
13	6 22	5 11	2 10	10 51	7 16	4 14	2 13	Morn	8 0	3 49	1 20	0 40
14	6 22	5 8	2 47	11 50	7 18	4 12	2 34	0 45	8 0	3 49	1 43	1 47
15	6 25	5 6	3 18	Morn	7 20	4 11	2 57	1 51	8 1	3 49	2 6	2 57
16	6 27	5 4	3 45	0 51	7 21	4 10	3 17	3 0	8 2	3 49	2 33	4 10
17	6 28	5 2	4 8	1 56	7 23	4 9	3 40	4 9	8 3	3 49	3 6	5 24
18	6 30	5 0	4 32	3 3	7 25	4 8	4 6	5 20	8 4	3 50	3 49	6 39
19	6 31	4 58	4 53	4 10	7 27	4 7	4 35	6 35	8 5	3 50	4 36	7 51
20	6 32	4 56	5 15	5 19	7 28	4 6	5 11	7 49	8 5	3 51	5 37	8 57
21	6 34	4 54	5 40	6 27	7 30	4 4	5 56	9 1	8 6	3 51	6 50	9 50
22	6 36	4 52	6 6	7 40	7 31	4 3	6 50	10 10	8 6	3 51	8 7	10 37
23	6 38	4 50	6 37	8 53	7 33	4 2	7 54	11 8	8 6	3 51	9 26	11 12
24	6 40	4 47	7 15	10 5	7 34	4 0	9 6	11 58	8 7	3 52	10 44	11 42
25	6 42	4 45	8 3	11 13	7 36	3 58	10 22	Aft.	8 7	3 52	Morn	Aft.
26	6 44	4 43	9 0	Aft.	7 37	3 57	11 40	1 8	8 8	3 53	0 2	0 30
27	6 46	4 41	10 5	1 10	7 39	3 56	Morn	1 36	8 8	3 54	1 17	0 52
28	6 48	4 39	11 18	1 54	7 40	3 55	0 57	1 59	8 9	3 55	2 31	1 17
29	6 50	4 37	Morn	2 32	7 42	3 55	2 13	2 22	8 9	3 56	3 43	2 42
30	6 51	4 36	0 34	3 2	7 44	3 54	3 29	2 47	8 9	3 57	4 53	3 12
31	6 53	4 34	1 53	3 28					8 9	3 58	5 59	3 49

CHANGES OF THE MOON, 1850,

And when she is at her greatest distance (*Apogee*), or at her least distance (*Perigee*), from the Earth in each lunation.

	First Quarter.	Full Moon.	Second Quarter.	New Moon.	Perigee.	Apogee.
	D. H. M.	D. H. M.	D. H. M.	D. H. M.	D. H.	D. H.
January ..	21st .. 9 40 a.m.	28th .. 0 51 a.m.	5th .. 8 37 a.m.	13th .. 11 19 a.m.	27th ..4 a.m.	12th.. 8 a.m.
February ..	19th .. 8 12 a.m.	26th .. noon.	4th .. 1 18 a.m.	12th .. 6 29 a.m.	24th..11 a.m.	8th.. 3 p.m.
March	21st .. 3 58 a.m.	27th .. 11 26 p.m.	5th .. 8 5 p.m.	13th .. 11 17 p.m.	24th.. 3 a.m.	8th.. 8 a.m.
April	19th .. 10 7 a.m.	26th .. 11 20 a.m.	4th .. 3 44 p.m.	12th .. 0 47 p.m.	18th.. noon	5th.. 4 a.m.
May........	18th .. 3 52 p.m.	26th .. 0 8 a.m.	4th .. 10 46 a.m.	11th .. 11 9 p.m.	14th.. 8 p.m.	2nd.. midnt. 30th.. 5 p.m.
June	16th .. 10 23 p.m.	24th .. 2 10 p.m.	3rd .. 3 47 a.m.	10th .. 7 20 a.m.	11th.. 7 p.m.	27th.. 4 a.m.
July	16th .. 6 41 a.m.	25th .. 5 24 a.m.	2nd .. 5 58 p.m.	9th .. 2 27 p.m.	10th.. 3 a.m.	24th..10 a.m.
August	14th .. 5 46 p.m.	22nd .. 9 12 p.m.	1st .. 5 17 a.m. 30th .. 2 18 p.m.	7th .. 9 34 p.m.	7th.. 1 p.m.	20th.. 3 p.m.
September	13th .. 8 21 a.m.	21st .. 0 40 p.m.	28th .. 9 53 p.m.	6th .. 5 28 a.m.	4th..10 p.m.	17th.. 1 a.m.
October....	13th .. 2 30 a.m.	21st .. 3 11 a.m.	—	5th .. 2 56 p.m.	2nd..11 p.m. 29th.. 4 p.m.	14th.. 6 p.m.
November..	11th .. 11 15 p.m.	19th .. 4 35 p.m.	26th .. 0 32 p.m.	4th .. 2 40 a.m.	23rd.. 3 p.m.	11th.. 2 p.m.
December ..	11th .. 8 37 p.m.	19th .. 5 3 a.m.	25th .. 9 24 p.m.	3rd .. 5 16 p.m.	21st.. 6 a.m.	9th..11 a.m.

TIDE TABLE, showing the TIMES of HIGH WATER at LONDON BRIDGE throughout the Year.

Days.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.	
	Morn.	After.	Morn.	After.	Morn.	After.	Morn.	After.	Morn.	After.	Morn.	After.	Morn.	After.	Morn.	After.	Morn.	After.	Morn.	After.	Morn.	After.	Morn.	After.
	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.
1	3 45	4 10	5 5	5 25	4 0	4 20	4 50	5 5	4 55	5 10	5 50	6 10	6 5	6 25	7 0	7 25	8 20	9 5	9 30	10 15	11 50	N.T.	N.T.	0 20
2	4 35	5 0	5 45	6 5	4 40	5 0	5 25	5 40	5 30	5 50	6 35	6 55	6 50	7 10	7 55	8 20	9 45	10 25	11 0	11 40	0 20	0 45	0 45	1 10
3	5 20	5 50	6 30	6 50	5 15	5 35	6 0	6 20	6 10	6 35	7 20	7 50	7 40	8 5	9 0	9 35	11 10	11 45	N.T.	0 10	1 10	1 30	1 30	1 55
4	6 15	6 35	7 15	7 35	5 55	6 15	6 40	7 5	7 0	7 25	8 25	9 0	8 40	9 15	10 10	10 45	N.T.	0 20	0 40	1 0	1 50	2 10	2 10	2 30
8	7 0	7 25	8 5	8 35	6 35	6 55	7 30	8 0	7 55	8 40	9 35	10 5	9 45	10 15	11 25	Midn	0 50	1 20	1 25	1 50	2 30	2 50	2 50	3 10
6	7 55	8 25	9 10	9 50	7 15	7 45	8 45	9 25	9 15	9 55	10 35	11 5	10 50	11 20	N.T.	0 35	1 45	2 5	2 10	2 30	3 10	3 25	3 30	3 45
7	9 0	9 35	10 25	11 5	8 10	8 50	10 10	10 45	10 30	11 5	11 35	Midn	11 50	N.T.	1 2	1 30	2 30	2 55	2 55	3 15	3 45	4 5	4 5	4 20
8	10 10	10 44	11 40	N.T.	9 30	10 15	11 25	Midn	11 35	N.T.	N.T.	0 30	0 20	0 50	1 55	2 20	3 15	3 40	3 35	3 50	4 20	4 40	4 40	5 0
9	11 20	11 50	0 17	0 44	10 55	11 35	N.T.	0 25	0 5	0 25	0 50	1 15	1 15	1 40	2 45	3 10	3 55	4 20	4 10	4 30	4 55	5 15	5 15	5 35
10	N.T.	0 20	1 6	1 30	N.T.	0 10	0 50	1 10	0 45	1 5	1 40	2 0	2 6	2 30	3 35	3 55	4 40	5 0	4 50	5 5	5 35	5 55	5 55	6 15
11	0 45	1 10	1 50	2 10	0 38	1 0	1 30	1 45	1 30	1 45	2 25	2 48	3 0	3 25	4 20	4 45	5 15	5 35	5 25	5 45	6 20	6 45	6 40	7 0
12	1 30	1 50	2 25	2 45	1 20	1 40	2 0	2 20	2 5	2 25	3 10	3 35	3 50	4 10	5 5	5 25	5 55	6 20	6 5	6 30	7 10	7 45	7 30	8 0
13	2 10	2 25	3 0	3 15	2 0	2 20	2 40	2 55	2 45	3 5	3 55	4 20	4 35	5 0	5 50	6 10	6 40	7 5	6 50	7 20	8 25	9 5	8 35	9 10
14	2 45	3 0	3 35	3 50	2 35	2 50	3 10	3 30	3 30	3 45	4 45	5 10	5 25	5 50	6 30	6 55	7 30	8 0	7 55	8 35	9 40	10 20	9 45	10 15
15	3 20	3 35	4 5	4 20	3 10	3 25	3 50	4 5	4 10	4 30	5 35	6 5	6 15	6 40	7 20	7 45	8 40	9 20	9 20	10 0	10 50	11 25	10 50	11 20
16	3 50	4 10	4 35	4 55	3 40	3 55	4 25	4 45	4 50	5 15	6 30	7 0	7 5	7 30	8 15	8 50	10 0	10 45	10 40	11 15	11 50	N.T.	11 50	N.T.
17	4 25	4 40	5 10	5 30	4 15	4 30	5 5	5 30	5 45	6 10	7 30	8 5	8 0	8 30	9 30	10 5	11 20	Midn	11 50	N.T.	0 15	0 35	0 10	0 35
18	4 55	5 15	5 50	6 5	4 50	5 5	5 50	6 15	6 40	7 10	8 35	9 15	9 5	9 35	10 40	11 20	N.T.	0 25	0 15	0 35	0 55	1 15	0 55	1 20
19	5 35	5 50	6 30	6 50	5 25	5 45	6 45	7 15	7 45	8 20	9 45	10 15	10 10	10 40	11 55	N.T.	0 50	1 10	0 55	1 15	1 30	1 50	1 40	2 5
20	6 10	6 30	7 15	7 40	6 5	6 30	7 50	8 30	9 5	9 40	10 50	11 20	11 15	11 50	0 25	0 50	1 30	1 45	1 30	1 45	2 10	2 30	2 30	2 50
21	6 55	7 20	8 15	8 55	6 50	7 20	9 15	9 55	10 15	10 50	11 50	N.T.	N.T.	0 20	1 15	1 35	2 5	2 20	2 5	2 20	2 45	3 5	3 15	3 35
22	7 45	8 15	9 35	10 15	7 55	8 35	10 40	11 20	11 25	11 55	0 15	0 45	0 45	1 10	1 55	2 10	2 35	2 50	2 35	2 55	3 25	3 45	3 59	4 25
23	8 50	9 30	11 0	11 45	9 20	10 5	11 50	N.T.	N.T.	0 20	1 5	1 30	1 35	1 55	2 30	2 45	3 5	3 20	3 10	3 30	4 9	4 30	4 45	5 10
24	10 4	10 45	N.T.	0 20	10 50	11 35	0 20	0 45	0 45	1 5	1 50	2 10	2 15	2 30	3 5	3 20	3 40	3 55	3 45	4 5	4 50	5 15	5 35	6 5
25	11 25	Midn	0 50	1 20	N.T.	0 10	1 10	1 35	1 30	1 50	2 30	2 50	2 50	3 10	3 35	3 50	4 10	4 25	4 20	4 40	5 40	6 10	6 30	6 55
26	N.T.	0 30	1 45	2 10	0 40	1 6	1 55	2 10	2 10	2 30	3 5	3 25	3 25	3 40	4 5	4 20	4 45	5 5	5 0	5 20	6 40	7 10	7 25	7 55
27	0 59	1 30	2 35	2 55	1 30	1 55	2 35	2 50	2 50	3 5	3 45	4 0	3 55	4 15	4 35	4 55	5 20	5 40	5 45	6 15	7 40	8 20	8 30	9 5
28	1 54	2 20	3 20	3 40	2 15	2 40	3 10	3 30	3 25	3 40	4 15	4 35	4 30	4 45	5 10	5 30	6 0	6 25	6 40	7 15	9 5	9 40	9 40	10 15
29	2 47	3 15			2 55	3 15	3 45	4 0	4 0	4 15	4 50	5 10	5 5	5 20	5 45	6 5	6 55	7 25	7 50	8 35	10 15	10 55	10 50	11 25
30	3 35	4 0			3 35	3 55	4 20	4 40	4 35	4 50	5 30	5 45	5 40	5 55	6 25	6 50	8 0	8 45	9 20	10 5	11 30	11 55	11 55	N.T.
31	4 20	4 40			4 13	4 30			5 10	5 30			6 15	6 40	7 15	7 45			10 50	11 20			0 25	0 45

TIDE TABLE OF THE PRINCIPAL PORTS,

Showing the time of High Water by adding or subtracting the numbers annexed, from those giving the time of High Water at London Bridge.

	h. m.		h. m.		h. m.
Aberdovy	Add 5 23	Guernsey Pier	Add 4 23	Agnes, St. Lights	Add 2 23
Aberystwith	Add 5 23	Hastings	Sub. 3 31	Amsterdam	Add 0 53
Achill Head	Add 3 53	Holyhead	Sub. 4 7	Antwerp	Add 2 18
Agnes (St.) Scilly		Howth Harbour	Sub. 2 59	Archangel	Add 3 53
Isles	Add 2 23	Kenmare River	Add 1 23	Bayonne	Add 1 23
Air Point, Isle of		Kinsale Harbour	Add 2 23	Bergen	Sub. 0 37
Man	Sub. 3 0	Kirkcudbright	Sub. 2 52	Bermudas (Isle)	Add 4 53
Alderney Pier, E.		Land's End	Add 2 23	Blanco (Cape) Af.	Sub. 4 22
Channel	Add 4 38	Leith Pier	Add 0 15	Boston	Sub. 2 42
Arran Isle, Scot.	Sub. 2 52	Limerick	Add 4 23	Botany Bay	Sub. 5 53
Baltimore	Add 1 38	Lizard	Add 0 8	Boulogne	Sub. 2 41
Banff	Sub. 1 26	Londonderry	Add 3 55	Bordeaux	Add 4 45
Bantry Bay	Add 1 39	Lowestoff	Sub. 3 37	Bremen	Add 3 53
Barmouth	Add 5 48	Lynn Regis	Add 4 38	Brest	Add 1 39
Barnstaple Bar	Add 3 23	Margate	Sub. 2 2	Cadiz	Add 0 23
Beachy, on Shore	Sub. 3 52	Milford Haven	Add 3 38	Caen	Sub. 5 7
Beachy (Offing)	Sub. 3 7	Montrose	Sub. 0 22	Calais	Sub. 2 19
Beaumaris	Sub. 3 41	Mount's Bay	Add 2 33	Calcutta	Add 0 58
Belfast	Sub. 4 2	Needle's Point	Sub. 4 22	Charlotte (Q.) Sd.	Sub. 5 7
Berwick	Add 0 11	Newcastle	Add 1 53	Cherbourg	Add 5 23
Blakeney Harb.	Add 4 43	Newport	Add 4 38	Christmas Harb.	Sub. 4 7
Bridgewater	Add 4 38	Newhaven	Sub. 2 17	Christmas Sound	Add 0 23
Bridport	Add 3 53	Nore Light	Sub. 0 58	Churchill River	Add 5 13
Brighton	Sub. 3 0	Orfordness	Sub. 3 27	Cornwallis (Port)	Add 4 7
Cardigan Bar	Add 4 53	Orkney Isles	Sub. 3 37	Dieppe	Sub. 3 2
Caermarthen	Add 4 3	Pembroke	Add 3 57	Drake's Island	Add 3 38
Carlisle	Sub. 2 7	Penzance	Add 2 23	Drontheim	Add 0 8
Carnarvon	Sub. 4 47	Peterhead	Sub. 1 22	Fayal Town	Add 0 13
Chester Bar	Sub. 3 37	Plymouth	Add 3 26	Francisco (St.)	Sub. 2 42
Clear Cape	Add 1 53	Portland Race	Sub. 4 52	Gibraltar	Sub. 2 8
Cork Harbour	Add 2 23	Portland Road	Add 4 8	Good Hope (C.)	Add 0 53
Cornwall Cape	Add 2 23	Port Patrick	Sub. 3 7	Good Hope (Tn.)	Add 0 23
Cowes, I. of W.	Sub. 3 22	Portsmouth	Sub. 2 27	Goree (Isle)	Sub. 0 37
Cromartie	Sub. 2 22	Ramsgate	Sub. 2 47	Granville	Add 4 2
Dartmouth	Add 3 58	Rye Harbour	Sub. 3 27	Gravelines	Sub. 2 14
Deal	Sub. 2 52	Scarborough	Add 2 18	Hague	Add 6 8
Dingle Bay	Add 1 23	Scilly Islands	Add 2 25	Halifax	Add 5 23
Donaghadee	Sub. 4 52	Selsea Harbour	Sub. 2 52	Hamburgh	Add 3 35
Donegal Bar	Add 2 58	Shannon Mouth	Add 1 43	Havre de Grace	Sub. 4 15
Dover Pier	Sub. 2 57	Sheerness	Sub. 1 28	Helena (St.)	Add 0 8
Downs (Stream)	Add 0 38	Shields	Add 0 53	Hogue (Cape la)	Sub. 2 7
Dublin Bar	Sub. 2 55	Shoreham	Sub. 2 52	Honfleur	Sub. 4 37
Dudgeon Lights	Add 5 23	Sligo Bay	Add 3 52	John's, St. Amer.	Add 3 53
Dunbar	Sub. 0 13	Southampton	Sub. 2 27	Lisbon	Add 0 8
Duncansby Head	Sub. 5 52	Spithead	Sub. 4 37	Madeira	Sub. 2 3
Dundalk	Sub. 3 7	St. Ives	Add 2 23	Malo's (St.)	Add 3 53
Dundee	Add 0 28	Sunderland	Add 0 53	Monterey	Add 5 23
Dungarvon	Add 2 23	Swansea	Add 3 48	Nantes	Add 0 53
Dungeness	Sub. 3 17	Tees River	Add 1 23	New York	Sub. 5 7
Eddystone	Add 3 8	Torbay	Add 3 58	Nieuport	Sub. 2 22
Edinburgh	Add 2 23	Tralee Bay	Add 1 38	Nootka Sound	Sub. 1 17
Exmouth Bar	Add 4 18	Tynemouth	Add 0 43	Ostend	Sub. 1 12
Eyemouth	Add 0 8	Waterford	Add 3 43	Philadelphia	Add 0 53
Falmouth	Add 3 8	Wexford	Add 5 23	Pickersgill's Har.	Sub. 3 10
Flambro' Head	Add 2 23	Weymouth	Add 4 23	P. of Wales's Fort	Add 5 13
Folkestone, W.P.	Sub. 3 37	Whitby	Add 1 38	Quebec	Add 5 23
Foreland, North	Sub. 2 22	Whitehaven	Sub. 2 52	Resolution Bay	Add 0 23
Foreland, South	Sub. 2 47	Wicklow	Sub. 5 7	Rio Janeiro	Sub. 0 2
Fowey	Add 3 23	Wisbeach	Add 5 23	Rochelle	Sub. 1 38
Galloway (Mull)	Sub. 2 52	Yarmouth Roads	Sub. 5 27	Rochfort	Sub. 2 8
Galway Bay	Add 2 23	Yarmouth Sands	Sub. 3 37	Rotterdam	Add 0 53
Gravesend	Sub. 0 37	Youghall	Add 2 53	Rouen	Sub. 0 52
Greenock	Sub. 2 22			Senegal	Sub. 3 37
Greenwich	Sub. 0 20	Abbeville	Sub. 3 37	Valery sur Som.	Sub. 4 7

TABLE, by Edward J. Dent, Esq., F.R.A.S., Chronometer-maker to her Majesty, exhibiting the Difference of Time arising from Difference in Longitude between the Observatory at Greenwich, and two or more principal Places in each of the English Counties; also North and South Wales, Edinburgh, Dublin, and Paris.

N.B. *The letters* S *and* F *denote respectively Slow and Fast.*
W *and* E ,, ,, *West and East.*

		m.	s.		
Beds...	Bedford	1	52	W.	S.
	Leighton Buzzard	2	39	—	—
Berks.	Abingdon	5	7	—	—
	Windsor	2	22	—	—
Bucks.	Buckingham	3	57	—	—
	Aylesbury	3	21	—	—
Cambr.	Cambridge	0	23	E.	F.
	Ely	1	4	—	—
Chesh.	Chester	11	32	W.	S.
	Macclesfield	8	30	—	—
Cornw.	Falmouth	20	12	—	—
	Truro	20	6	—	—
Cumb.	Carlisle	11	38	—	—
	Penrith	10	56	—	—
Derby.	Derby	5	52	—	—
	Chesterfield	5	40	—	—
Devon.	Exeter	14	18	—	—
	Plymouth	16	30	—	—
Dorset	Dorchester	9	43	—	—
	Bridport	11	24	—	—
Durh.	Durham	6	16	—	—
	Darlington	6	12	—	—
Essex.	Colchester	3	32	E.	F.
	Maldon	2	42	—	—
	Chelmsford	1	52	—	—
Glouc.	Gloucester	8	58	W.	S.
	Cheltenham	8	16	—	—
Hants.	Southampton	5	36	—	—
	Portsmouth	4	24	—	—
Heref.	Hereford	10	52	—	—
	Leominster	10	54	—	—
Herts.	Hertford	0	16	—	—
	Tring	2	38	—	—
Hunts.	Huntingdon	0	45	—	—
	Kimbolton	1	37	—	—
Kent..	Greenwich Obser.	0	0	—	—
	Dover	5	16	E.	F.
	Tunbridge Wells	1	1	—	—
Lanc..	Lancaster	11	10	W.	S.
	Manchester	9	0	—	—
	Liverpool	11	53	—	—
Leices.	Leicester	4	33	—	—
	Melton Mowbray	3	33	—	—
Lincoln	Lincoln	2	4	—	—
	Louth	0	0	—	—
Middlesex	St. Paul's	0	23	—	—
	82, Strand	0	28	—	—
	St. James's Church, Piccadilly	0	32	—	—
	Hampton Court	1	20	—	—
Monm.	Monmouth	10	48	W.	S.
	Abergavenny	12	0	—	—
Norf.	Norwich	5	12	E.	F.
	Fakenham	3	24	—	—
Northampt.	Northampton	3	36	W.	S.
	Peterborough	0	58	—	—
Northumb.	Alnwick	6	48	—	—
	Newcastle	6	24	—	—
Notts.	Nottingham	4	41	—	—
	Retford	3	25	—	—
Oxford	Oxford	5	1	—	—
	Chipping Norton	6	12	—	—
Rutland	Oakham	3	20	—	—
Salop.	Shrewsbury	10	56	—	—
	Oswestry	12	8	—	—
Somerset	Taunton	12	21	—	—
	Bath	9	26	—	—
Stafford	Stafford	8	40	—	—
	Lichfield	7	18	—	—
	Tamworth	6	49	—	—
Suffolk	Ipswich	4	38	E.	F.
	BurySt.Edmund's	2	53	—	—
Surrey	Guildford	2	18	W.	S.
	Croydon	0	26	—	—
Sussex	Brighton	0	32	—	—
	Hastings	2	20	E.	F.
Warw.	Warwick	6	20	W.	S.
	Birmingham	7	33	—	—
	Coventry	6	1	—	—
Westmorl.	Kendal	11	0	—	—
	Appleby	10	0	—	—
Wilts	Marlborough	6	53	—	—
	Devizes	7	55	—	—
Worcester	Worcester	8	41	—	—
	Kidderminster	8	58	—	—
Yorks.	Beverley	1	42	—	—
	York	4	24	—	—
	Leeds	6	4	—	—
North Wales	Holyhead	18	36	—	—
	Bangor	16	14	—	—
South Wales	Cardigan	18	40	—	—
	Carmarthen	17	16	—	—
Edinburgh		12	43	—	—
Dublin		25	21	—	—
Paris		9	21	E.	F.

THE BAROMETER.

THE rising of the quicksilver generally presages fair weather, the falling generally indicating rain and snow.

When bad weather *quickly* succeeds the falling of the mercury, it will not be of long continuance, and the reverse when fair weather *soon* follows the rise of the quicksilver.

On the contrary, if in bad weather the mercury rises, and continues advancing for two or three days, a continuance of fair weather may be expected. If, in clear weather, the mercury falls for two or three days before rain, it is probable that it will be succeeded by rain and high winds.

In winter, the rising indicates frost; and in frosty weather, if the mercury falls three or four divisions, a thaw; but if rising in a continued frost, it will be accompanied with snow.

In hot weather, the sudden falling of the mercury portends thunder, while if the earth continues moist, and water stands in hollow places, no trust should be put in the clearest sky.

LAW TERMS, 1850.

HILARY TERM begins Jan. 11th, and ends Jan. 31st, and contains 21 days.

EASTER TERM begins April 15th, and ends May 8th, and contains 24 days.

TRINITY TERM begins May 22nd, and ends June 12th, and contains 22 days.

MICHAELMAS TERM begins Nov. 2nd, and ends Nov. 25th, and contains 24 days.

POPULATION OF GREAT BRITAIN.

1841..	England and Wales	15,901,981
	Scotland	2,624,586
	Ireland	8,205,382
	Guernsey, Jersey, and Man	124,079
	Total	26,856,028

Annual Births .. .. 517,739 | Annual Deaths 349,519

Population of London 1,915,000

Annual Births .. .. 60,240 | Annual Deaths 45,147

Weekly Averages of Deaths 850

Of 100,000 persons born, only 33,060 males, and 32,464 females (total, 65,524) attain the age of 21. Of 100 born, only 40 attain the age of 10, and 4 that of 80. At Northampton, of 1,000 born in the same year, only 254 reached the age of 50, and only 1 that of 94. At the age of 32 the mortality of the whole kingdom is 1 in 95.

NATIONAL DEBT.

THE following Table exhibits the several variations in this public burden at twenty-six different periods, from the year 1688, when it commenced:—

1689 the Debt was	£664,263	1784 the Debt was	£249,851,628
1702	16,394,702	1790	228,231,228
1710	50,000,000	1793	239,350,148
1714	54,145,363	1800	451,699,919
1720	54,272,000	1805	549,137,068
1727	52,092,238	1810	631,369,168
1730	47,705,100	1815	848,284,000
1740	44,072,024	1817	848,282,477
1750	72,178,898	1820	848,395,804
1760	88,341,268	1825	833,391,875
1763	138,865,430	1833	781,378,549
1770	126,963,267	1838	762,771,224
1780	142,113,264	1841	837,521,684

STAMP DUTIES.

BILLS.

Not exceeding 2 months aft. date, or 60 days aft. sight.				Longer period.	
For £2	and not exceeding £5 5s.	1	0	1	6
Above 5 5s.	20	1	6	2	0
20	30	2	0	2	6
30	50	2	6	3	6
50	100	3	6	4	6
100	200	4	6	5	0
200	300	5	0	6	0
300	500	6	0	8	6
500	1,000	8	6	12	6
1,000	2,000	12	6	15	0
2,000	3,000	15	0	25	0
3,000	..	25	0	30	0

Penalty for post-dating Bills of Exchange £100.

FOREIGN.

When in sets, then for every bill		s.	d.
of each set not exceed. £100		1	6
Above 100 and not above	200	3	0
200	500	4	0
500	1,000	5	0
1,000	2,000	7	6
2,000	3,000	10	0
3,000	..	15	0

N.B.—Promissory notes for £100 or under are not to be drawn payable to the bearer on demand, except bankers' reissuable notes, which require a different stamp.

AGREEMENTS.

Of the value of £20 and upwards, containing only 1080 words, 2*s.* 6*d.*; more than 1080 words, £1. 15*s.*; and for every further 1080 words, £1. 5*s.* Agreements requiring the 2*s.* 6*d.* stamp must be stamped within fourteen days from the date; afterwards they can only be stamped upon payment of a penalty of £10.

CONVEYANCES.

When consideration under £20 .. 10*s.*

Under	Duty		Under	Duty
£50	£1	0	8,000	£75
150	1	10	9,000	85
300	2	0	10,000	95
500	3	0	12,500	110
750	6	0	15,000	130
1,000	9	0	20,000	170
2,000	12	0	30,000	240
3,000	25	0	40,000	350
4,000	35	0	50,000	450
5,000	45	0	60,000	550
6,000	55	0	80,000	650
7,000	65	0	100,000	800

LETTERS OF ATTORNEY.

Commission or factory, or deed of procuration £1 0

Progressive duty on words.

PROBATE OF WILLS, &c.

	With a Will.		Without a Will.	
Under £50	—		£0	10
100	£0	10	1	0
200	2	0	3	0
300	5	0	8	0
450	8	0	11	0
600	11	0	15	0
800	15	0	22	0
1,000	22	0	30	0
1,500	30	0	45	0
2,000	40	0	60	0
3,000	50	0	75	0
4,000	60	0	90	0
5,000	80	0	120	0
6,000	100	0	150	0
7,000	120	0	180	0
8,000	140	0	210	0
9,000	160	0	240	0
10,000	180	0	270	0
12,000	200	0	300	0
14,000	220	0	330	0
16,000	250	0	375	0
18,000	280	0	420	0
20,000	310	0	465	0
25,000	350	0	523	0
30,000	400	0	600	0
35,000	450	0	675	0
40,000	525	0	785	0
45,000	600	0	980	0
50,000	675	0	1,010	0
60,000	750	0	1,125	0
70,000	900	0	1,350	0
80,000	1,050	0	1.575	0
90,000	1,200	0	1,800	0
100,000	1,350	0	2,025	0
120,000	1,500	0	2,250	0

The scale continues to increase up to £1,000,000.

LICENSES.

For Marriage in England (special)	£5	0
Ditto (if not special)	0	10
For Bankers	30	0
Dealers in Gold	4	0

BONDS, MORTGAGES, &c.

Not exceeding £50		£1	0
Above £50 and not above	£100	1	10
100	200	2	0
200	300	3	0
300	500	4	0
500	1,000	5	0
1,000	2,000	6	0
2,000	3,000	7	0
3,000	4,000	8	0
4,000	5,000	9	0
5,000	10,000	12	0
10,000	15,000	15	0
15,000	20,000	20	0
20,000	..	25	0

RECEIPTS.

	s.	d.
For £5 and under £10	0	3
10 20	0	6
20 50	1	0
50 100	1	6
100 200	2	6
200 300	4	0
300 500	5	0
500 1,000	7	6
1,000 or upwards	10	0

LEASES.

	s.	d.
Where rent under £20	1	0
If £20 and under 100	1	10
100 200	2	0
200 400	3	0
400 600	4	0
600 800	5	0
800 1,000	6	0
1000 or upwards	10	0

MARINE INSURANCE.

	s.	d.
If the premium does not exceed the rate of 10s. per centum on the sum insured	0	3
Not exceeding 20s. per cent.	0	6
Not exceeding 30s. per cent.	1	3
Not exceeding 40s. per cent.	2	0
Not exceeding 50s. per cent.	3	0
If exceeding 50s. per centum	4	0
Policy for any certain period of time, for every £100, and also for any fractional part of £100—		
Not exceeding 6 calendar months	2	6
Exceeding 6 calendar months	4	0

ASSESSED TAXES.

WINDOWS.

No. of Win.	£	s.	d.	No. of Windows.	£	s.	d.
8	0	16	6	35	11	18	3
9	1	1	0	36	12	6	9
10	1	8	0	37	12	15	3
11	1	16	3	38	13	3	6
12	2	4	9	39	13	12	0
13	2	13	3	40 to 44	14	8	9
14	3	1	9	45 .. 49	15	16	9
15	3	10	0	50 .. 54	17	5	0
16	3	18	6	55 .. 59	18	13	0
17	4	7	0	60 .. 64	19	17	9
18	4	15	3	65 .. 69	20	0	3
19	5	3	9	70 .. 74	22	2	6
20	5	12	3	75 .. 79	23	5	0
21	5	0	6	80 .. 84	24	7	6
22	6	9	0	85 .. 89	25	10	0
23	6	17	6	90 .. 94	26	12	3
24	7	5	9	95 .. 99	27	14	9
25	7	14	3	100 .. 109	29	8	6
26	8	2	9	110 .. 119	31	13	3
27	8	11	0	120 .. 129	33	18	3
28	8	19	6	130 .. 139	36	3	0
29	9	8	0	140 .. 149	38	8	0
30	9	16	3	150 .. 159	40	12	9
31	10	4	9	160 .. 169	42	17	9
32	10	13	3	170 .. 179	45	2	6
33	11	1	6	180 & upwards			
34	11	10	0		46	11	3

Exemptions.—Charity schools, hospitals, and poor-houses (excepting the apartments for officers and servants); places for divine worship; dairies and cheese-rooms if made of lath or wire, or of glass, if the room not used to sleep in, and "dairy and cheese-room" is painted over the door. Three windows in the shop or warehouse, if on the basement story. The windows of a room used solely as a manufactory, if not communicating with the dwelling-house, though adjoining thereto. Windows in any farm-house occupied by a tenant at a rack-rent less than £200 per annum; or any farm-house occupied by the owner or tenant of any farm not rack-rent, of which the yearly value shall be under £100 per annum, provided the owner of such farm-house shall not derive any yearly income exceeding £100 from any other source.

PENALTIES UNDER THE STAMP ACT.

For *Attorneys* and *Solicitors* acting without having been admitted, £100.—For acting without certificate, £50.

For drawing a *Bill* or *Promissory Note* upon unstamped paper, £50.—For post-dating *Bills of Exchange*, £100.

For drawing a *Cheque* more than ten miles from the place where made payable, £100.—For receiving the same in payment, £20.—For Bankers paying the same, £100.

For setting out wrong amount in a *Conveyance*, on the attorney, £500. On the purchaser, £50.

For taking possession of effects of any one deceased, without taking *Probate or Administration* within six months, £100.

For giving a *Receipt* upon unstamped paper, if under £100—£10; if above £100—£20.—For refusing to give a receipt upon a stamp, £10.—For giving a receipt upon a stamp too low for the amount thereon specified, £10.—For giving the receipt for less than the sum received, £50.

TABLE showing the RATES of PROPERTY and INCOME TAX.

£	£	s.	d.	£	£	s.	d.	£	£	s.	d.	£	£	s.	d.
5	0	2	11	300	8	15	0	1,400	40	16	8	3,600	105	0	0
10	0	5	10	325	9	9	7	1,500	43	15	0	3.700	107	18	4
15	0	8	9	350	10	4	2	1,600	46	13	4	3,800	110	16	8
20	0	11	8	375	10	18	9	1,700	49	11	8	3,900	113	15	0
25	0	14	7	400	11	13	4	1,800	52	10	0	4,000	116	13	4
50	1	9	2	425	12	7	11	1,900	55	8	4	4,100	119	11	8
100	2	18	4	450	13	2	6	2,000	58	6	8	4,200	122	10	0
125	3	12	11	475	13	17	1	2,100	61	5	0	4,300	125	8	4
150	4	7	6	500	14	11	8	2,200	64	3	4	4,400	128	6	8
155	4	10	5	550	16	0	10	2,300	67	1	8	4,500	131	5	0
160	4	13	4	600	17	10	0	2,400	70	0	0	4,600	134	3	4
165	4	16	3	650	18	19	2	2,500	72	18	4	4,700	137	1	8
170	4	19	2	700	20	8	4	2,600	75	16	8	4,800	140	0	0
175	5	2	1	750	21	17	6	2,700	78	15	0	4,900	142	18	4
180	5	5	0	800	23	6	8	2,800	81	13	4	5,000	145	16	8
185	5	7	11	850	24	15	10	2,900	84	11	8	7,500	218	15	0
190	5	10	10	900	26	5	0	3,000	87	10	0	10,000	291	13	4
195	5	13	9	950	27	14	2	3,100	90	8	4	20,000	583	6	8
200	5	16	8	1,000	29	3	4	3,200	93	6	8	30,000	875	0	0
225	6	11	3	1,100	32	1	8	3,300	96	5	0	40,000	1,166	13	4
250	7	5	10	1,200	35	0	4	3,400	99	3	4	50,000	1,458	6	8
275	8	0	5	1,300	37	18	0	3,500	102	1	0				

TABLE of INCOME or WAGES.

Per Yr.		PerMonth.			Per Week.			Per Day.			Per Yr.		PerMonth.			Per Week.			Per Day.		
£	s.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	£	s.	d.	£	s.	d.	£	s.	d.
1	0	0	1	8	0	0	4½	0	0	0¾	14	0	1	3	4	0	5	4½	0	0	9¼
1	10	0	2	6	0	0	7	0	0	1	15	0	1	5	0	0	5	9	0	0	10
2	0	0	3	4	0	0	9¼	0	0	1¼	16	0	1	6	8	0	6	2	0	0	10½
2	2	0	3	6	0	0	9¾	0	0	1½	17	0	1	8	4	0	6	6½	0	0	11¼
2	10	0	4	2	0	0	11½	0	0	1¾	18	0	1	10	0	0	6	11	0	0	11¾
3	0	0	5	0	0	1	1¾	0	0	2	19	0	1	11	8	0	7	3½	0	1	0½
3	3	0	5	13	0	1	2½	0	0	2	20	0	1	13	4	0	7	8	0	1	1¼
3	10	0	5	10	0	1	4¼	0	0	2¼	30	0	2	10	0	0	11	6	0	1	7¾
4	0	0	6	8	0	1	6½	0	0	2¾	40	0	3	6	8	0	15	4½	0	2	2¼
4	4	0	7	0	0	1	7½	0	0	2¾	50	0	4	3	4	0	19	3	0	2	9
4	10	0	7	6	0	1	8¾	0	0	3	60	0	5	0	0	1	3	0¾	0	3	3½
5	0	0	8	4	0	1	11	0	0	3¼	70	0	5	16	8	1	6	11	0	3	10
5	10	0	9	2	0	2	1½	0	0	3¾	80	0	6	13	4	1	10	9	0	4	4½
6	0	0	10	0	0	2	3¾	0	0	4	90	0	7	10	0	1	14	7¼	0	4	11
6	10	0	10	10	0	2	6	0	0	4¼	100	0	8	6	8	1	18	5	0	5	5¾
7	0	0	11	8	0	2	8¼	0	0	4½	200	0	16	13	4	3	16	11	0	10	11½
7	10	0	12	6	0	2	10½	0	0	5	300	0	25	0	0	5	15	4½	0	16	5¼
8	0	0	13	4	0	3	1	0	0	5¼	400	0	33	6	8	7	13	10	1	1	11
8	10	0	14	2	0	3	3¼	0	0	5½	500	0	41	13	4	9	12	3½	1	7	4¾
9	0	0	15	0	0	3	5½	0	0	6	600	0	50	0	0	11	10	9	1	12	10½
10	0	0	16	8	0	3	10	0	0	6½	700	0	58	6	8	13	9	2¾	1	18	4¼
11	0	0	18	4	0	4	3	0	0	7¼	800	0	66	13	4	15	7	8¼	2	3	10
12	0	1	0	0	0	4	7½	0	0	8	900	0	75	0	0	17	6	1¾	2	9	3¾
13	0	1	1	8	0	5	0	0	0	8½	1000	0	83	6	8	19	4	7¼	2	14	9½

INTEREST from £1 to £500, at FIVE PER CENT.

	1 Day.		2 Days.		3 Days.		4 Days.		5 Days.		10 Days.		20 Days.			30 Days.		
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	£	s.	d.	£	s.	d.
1	0	0	0	0	0	0	0	0	0	0	0	0¼	0	0	0½	0	0	0¾
2	0	0	0	0	0	0	0	0¼	0	0¼	0	0½	0	0	1¼	0	0	1¾
3	0	0	0	0	0	0¼	0	0¼	0	0¼	0	0¾	0	0	1¾	0	0	2¾
4	0	0	0	0¼	0	0¼	0	0½	0	0½	0	1¼	0	0	2½	0	0	3¾
5	0	0	0	0¼	0	0¼	0	0½	0	0¾	0	1½	0	0	3¼	0	0	4¾
6	0	0	0	0¼	0	0½	0	0¾	0	0¾	0	1¾	0	0	3¾	0	0	5¾
7	0	0	0	0¼	0	0½	0	0¾	0	1	0	2¼	0	0	4½	0	0	6¾
8	0	0¼	0	0½	0	0¾	0	1	0	1¼	0	2½	0	0	5¼	0	0	7¾
9	0	0¼	0	0½	0	0¾	0	1	0	1¼	0	2¾	0	0	5¾	0	0	8¾
10	0	0¼	0	0½	0	0¾	0	1¼	0	1½	0	3¼	0	0	6½	0	0	9¾
20	0	0½	0	1¼	0	1¾	0	2½	0	3¼	0	6½	0	1	1	0	1	7½
30	0	0¾	0	1¾	0	2¾	0	3¾	0	4¾	0	9¾	0	1	7½	0	2	5½
40	0	1¼	0	2½	0	3¾	0	5¼	0	6½	1	1	0	2	2¼	0	3	3¼
50	0	1½	0	3¼	0	4¾	0	6½	0	8	1	4¼	0	2	8¾	0	4	1¼
60	0	1¾	0	3¾	0	5¾	0	7¾	0	9¾	1	7½	0	3	3¼	0	4	11
70	0	2¼	0	4½	0	6¾	0	9	0	11½	1	11	0	3	10	0	5	9
80	0	2½	0	5¼	0	7¾	0	10½	1	1	2	2¼	0	4	4½	0	6	6¾
90	0	2¾	0	5¾	0	8¾	0	11¾	1	2¾	2	5½	0	4	11	0	7	4¾
100	0	3¼	0	6½	0	9¾	1	1	1	4¼	2	8¾	0	5	5¾	0	8	2½
200	0	6½	1	1	1	7½	2	2¼	2	8¾	5	5¾	0	10	11½	0	16	5¾
300	0	9¾	1	7½	2	5½	3	3¼	4	1¼	8	2½	0	16	5¼	1	4	7¾
400	1	1	2	2¼	3	3¼	4	4½	5	5¾	10	11½	1	1	11	1	12	10½
500	1	4¼	2	8¾	4	1¼	5	5¾	6	10	13	8¼	1	7	4¾	2	1	1

INTEREST from £1 to £500 at FIVE PER CENT.

	1 Mon.			2 Mon.			3 Mon.			4 Mon.			5 Mon.			6 Mon.			9 Mon.			12 Mon.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
1	0	0	1	0	0	2	0	0	3	0	0	4	0	0	5	0	0	6	0	0	9	0	1	0
2	0	0	2	0	0	4	0	0	6	0	0	8	0	0	10	0	1	0	0	1	6	0	2	0
3	0	0	3	0	0	6	0	0	9	0	1	0	0	1	3	0	1	6	0	2	3	0	3	0
4	0	0	4	0	0	8	0	1	0	0	1	4	0	1	8	0	2	0	0	3	0	0	4	0
5	0	0	5	0	0	10	0	1	3	0	1	8	0	2	1	0	2	6	0	3	9	0	5	0
6	0	0	6	0	1	0	0	1	6	0	2	0	0	2	6	0	3	0	0	4	6	0	6	0
7	0	0	7	0	1	2	0	1	9	0	2	4	0	2	11	0	3	6	0	5	3	0	7	0
8	0	0	8	0	1	4	0	2	0	0	2	8	0	3	4	0	4	0	0	6	0	0	8	0
9	0	0	9	0	1	6	0	2	3	0	3	0	0	3	9	0	4	6	0	6	9	0	9	0
10	0	0	10	0	1	8	0	2	6	0	3	4	0	4	2	0	5	0	0	7	6	0	10	0
20	0	1	8	0	3	4	0	5	0	0	6	8	0	8	4	0	10	0	0	15	0	1	0	0
30	0	2	6	0	5	0	0	7	6	0	10	0	0	12	6	0	15	0	1	2	6	1	10	0
40	0	3	4	0	6	8	0	10	0	0	13	4	0	16	8	1	0	0	1	10	0	2	0	0
50	0	4	2	0	8	4	0	12	6	0	16	8	1	0	10	1	5	0	1	17	6	2	10	0
60	0	5	0	0	10	0	0	15	0	1	0	0	1	5	0	1	10	0	2	5	0	3	0	0
70	0	5	10	0	11	8	0	17	6	1	3	4	1	9	2	1	15	0	2	12	6	3	10	0
80	0	6	8	0	13	4	1	0	0	1	6	8	1	13	4	2	0	0	3	0	0	4	0	0
90	0	7	6	0	15	0	1	2	6	1	10	0	1	17	6	2	5	0	3	7	6	4	10	0
100	0	8	4	0	16	8	1	5	0	1	13	4	2	1	8	2	10	0	3	15	0	5	0	0
200	0	16	0	1	13	4	2	10	0	3	6	8	4	3	4	5	0	0	7	10	0	10	0	0
300	1	5	0	2	10	0	3	15	0	5	0	0	6	5	0	7	10	0	11	5	0	15	0	0
400	1	13	4	3	6	8	5	0	0	6	13	4	8	6	8	10	0	0	15	0	0	20	0	0
500	2	1	8	4	3	4	6	5	0	8	6	8	10	8	4	12	10	0	18	15	0	25	0	0

CURRENT COINS.

GREAT BRITAIN.

Gold.

	dwt.	grs.	£	s.	d.
Double sovereign ..	10	6½	2	0	0
Sovereign	5	3¼	1	0	0
Half-sovereign ..	2	13⅝	0	10	0

Silver.

	dwt.	grs.	£	s.	d.
Crown	18	4¼	0	5	0
Half-crown	9	2	0	2	6
Shilling	3	15¼	0	1	0
Sixpence	1	19¾	0	0	6
Fourpence	1	5	0	0	4

Note.—The standard for gold coin in Great Britain is a mixture of eleven parts fine gold and one of alloy, 1 lb. troy of which is coined into 46 sovereigns and $\frac{89}{120}$ of another.

The standard for silver coin is a mixture of thirty-seven parts of fine silver and three of alloy, 1 lb. troy of which is coined into 66 shillings.

FRANCE.

Gold.

	dwt.	grs.	£	s.	d.
40 Franc piece ..	8	7	1	11	8½
20 do. ..	4	3½	0	15	10½

Silver.

	dwt.	grs.	£	s.	d.
5 Franc piece ..	16	1	0	4	0
2 do. ..	6	11	0	1	7
1 do. ..	3	5½	0	0	9½
½ or 50 centimes ..	1	15	0	0	4½
¼ or 25 do.	0	18½	0	0	2¼

HAMBURGH.

Gold.

	dwt.	grs.	£	s.	d.
Ducat of 6½ marks ..	2	5¾	0	9	4

Silver.

	dwt.	grs.	£	s.	d.
Rix-doll. or 3 marks	18	18	0	4	7
Mark, or 16 shillings	5	20	0	1	2½

HOLLAND.

Gold.

	dwt.	grs.	£	s.	d.
20 Florin piece ..	9	7¾	1	14	2¼
Ryder	6	10½	1	5	1¼
10 Florin piece ..	4	15	0	17	1
10 Williams, 1818 ..	7	7½	0	16	5½

Silver.

	dwt.	grs.	£	s.	d.
Ducaton	20	22	0	5	5
Ducat or rix-dollar ..	18	6	0	4	4
Florin	6	22	0	1	8½
Escalin	3	4	0	0	6

SPAIN.

Gold.

	dwt.	grs.	£	s.	d.
Doubloon of 8 crowns	17	9	3	4	8
Ditto 4 do.	8	16½	1	12	4
Ditto 2 do.	4	8¼	0	16	2
Half pistole, or crown	2	4	0	8	1

Silver.

	dwt.	grs.	£	s.	d.
Piastre	17	8	0	4	3¾
Peseta	3	18	0	0	10½
Half do.	1	21	0	0	5¼
Reallillo	0	22½	0	0	2½

PORTUGAL.

Gold.

	dwt.	grs.	£	s.	d.
Moidore of 4,800 reis	6	22	1	6	11¼
Half do	3	11	0	13	5½
Quarter do.	1	17½	0	6	8¾
Moiadobra	9	5	1	15	11
Half do.	4	14	0	17	10½
16 Testons	2	7	0	8	11
12 do.	1	17½	0	6	4¼
8 do.	1	3½	0	4	5¾
Cruzada	0	16¼	0	2	7¼

Silver.

	dwt.	grs.	£	s.	d.
New cruzada of 480 reis	9	1	0	4	11

RUSSIA.

Gold.

	dwt.	grs.	£	s.	d.
Ducat of 1763 ..	2	5¾	0	9	2½
Imperial of 10 rubles	7	17¼	1	12	9
Half do.	3	20½	0	16	4½

Silver.

	dwt.	grs.	£	s.	d.
Ruble of 100 copecks	15	10	0	3	2

PRUSSIA.

Gold.

	dwt.	grs.	£	s.	d.
Frederic d'or ..	4	7	0	16	6
Half do.	2	3½	0	8	3
Ducat	2	5¾	0	9	4

Silver.

	dwt.	grs.	£	s.	d.
Rix-dollar	14	6½	0	2	11¼
5 Groschen	2	9	0	0	5¾
Groscher			0	0	1¼

SWEDEN.

Gold.

	dwt.	grs.	£	s.	d.
Ducat	2	5	0	9	3¼
Half do.	1	2½	0	4	7½
Quarter do.	0	13¼	0	2	3¼

Silver.

	dwt.	grs.	£	s.	d.
Rix-dollar	18	17	0	4	6
Two-thirds do. ..	12	11	0	3	0
One-third do. ..	6	5	0	1	6

AMERICA (UNITED STATES).

Gold.

	dwt.	grs.	£	s.	d.
Eagle of 10 dollars	11	6	2	3	10
Half eagle of 5 do.	5	15	1	1	11
Quar. eagle of 2½ do.	2	19½	0	10	11½

Silver.

	dwt.	grs.	£	s.	d.
Dollar or 100 cents	17	5	0	4	3
Half-dollar, or 50 do.	8	14	0	2	1
Quar. dollar, or 25 do.	4	7	0	1	0

WEIGHTS and MEASURES.

By a law passed in the 51st year of the reign of Henry III., A.D. 1266, it was enacted, " that an English penny, called a sterling, round and without clipping, shall " weigh 32 *wheat corns in the midst of the ear*, and that twelve pence do make one " ounce, and that twelve ounces do make one pound."

Some authors consider that the *Avoirdupois* weight was brought into the country at the earliest period of the Romans, and was then called the Auncel Weight from its being used with the steel-yard (*Statera Romana*), or with the Auncel (*ansula*) or Danish steel-yard, having a fixed weight and moveable fulcrum. Others consider that the *Lombards* introduced the Troy and Avoirdupois weights, and that these were first sanctioned by law in 1496. All *butchers* were ordered to provide *beams, and scales*, and weights, which weights were called *haberdupois*, in the 24th year of Henry VIII. The hundred-weight, or rather the long hundred of 112 lbs., was first introduced as an allowance over and above the 100 lbs. in paying *custom dues*; that is, for every 112 lbs. weight of goods *dues* were only demanded for 100 lbs. The long hundred at first was allowed to be reckoned at 120 lbs.; it was subsequently lowered to 112½ lbs., and finally the *half-pound* was omitted, and the hundred-weight then, as now, was reckoned at 112 lbs. to the hundred.

The Imperial Weights of Avoirdupois, Troy, and Apothecaries' came into use, under authority of a law passed in 1824 (5 Geo. IV., cap. 74), on the first day of May, 1825; and, by an Act passed in 1835 (5 & 6 Wm. IV., cap. 63), the use of all other weights is rendered illegal.

TROY WEIGHT.

Grains.	Pennywts.	Oz.	lbs.
1	0·0416	0·002083	0·00017361
24	1	0·05	0·00416
480	20	1	0·083
5760	240	12	1

APOTHECARIES' WEIGHT.

Grns.	Scrup.	Dr.	Oz.	lbs.
1	0·05	0·016	0·002083	0·00017051
20	1	0·33	0·0416	0·003472
60	3	1	0·125	0·010416
480	24	8	1	0·083
5760	288	96	12	1

AVOIRDUPOIS WEIGHT.

Grains.	Dr.	Oz.	lbs.	Qrs.	Cwt.	Tons.
27·34375	1	0·0625	0·00390625	0·0001395089	0·0000348772	0·00000174386
437·5	16	1	0·0625	0·002231428	0·000557857	0·0000278928
7000	256	16	1	0·35714285	0·0892857842	0·0044642857
196000	7168	448	28	1	0·25	0·0125
784000	28672	1792	112	4	1	0·05
15680000	473440	35840	2240	80	20	1

TABLE OF EQUIVALENTS.

The following Tables will at once show the Equivalents of Troy weight in Avoirdupois weight, and, *vice versâ*, the equivalents of Avoirdupois weight in Troy weight, so that, with the large Avoirdupois weights generally kept on all works, the table will set forth what weights are correspondent or accord with the Troy weights, thus:—

1 cwt. Avoirdupois will weigh in Troy weight 136 lb. 1 oz. 2 dr. 40 gr., or 784,000 gr. Troy.

1 lb. Troy will weigh in Avoirdupois 13 oz. 72½ grs.

1 lb. Avoirdupois will weigh in Troy 1 lb. 2 oz. 4 drs. 40 grs.

The Troy lb. is 5,760 grs. The Avoirdupois is 7,000 grs.

½ cwt. of Avoirdupois (or 56 lbs.) is equivalent to 68 lbs. 0 oz. 5 drs. 20 grs. Troy.

56 lbs. Troy are equivalent to 46 lbs. 1 oz. 122½ grs. Avoirdupois.

1 ton Avoirdupois is equivalent to 2,722 lbs. 2 oz. 5 drs. 20 grs. Troy; and
2,240 lbs. Troy are equivalent to 1,843 lbs. 3 oz. 87½ grs. Avoirdupois.

TROY WEIGHT in Grains and in Avoirdupois Equivalents.

Troy.	Grains.	Avoirdup. lb.	oz.	grs.	Troy.	Grains.	Avoirdup. lb.	oz.	grs.
Grain ..	1	0	0	1	Lb. 17	97,920	13	15	357½
Scruple	20	0	0	20	18	103,680	14	12	430
Dwt. ..	24	0	0	24	19	109,440	15	10	65
Drachm	60	0	0	60	20	115,200	16	7	137½
Oz. 1	480	0	1	42½	21	120,960	17	4	210
2	960	0	2	85	22	126,720	18	1	282½
3	1,440	0	3	127½	23	132,480	18	14	355
4	1,920	0	4	170	24	138,240	19	11	427½
5	2,400	0	5	212½	25	144,000	20	9	62½
6	2,880	0	6	255	26	149,760	21	6	135
7	3,360	0	7	297½	27	155,520	22	3	207½
8	3,840	0	8	340	28	161,280	23	0	280
9	4,320	0	9	382½	29	167,040	23	13	352½
10	4,800	0	10	425	30	172,800	24	10	425
11	5,280	0	12	30	40	230,400	32	14	275
Lb. 1	5,760	0	13	72½	50	288,000	41	2	125
2	11,520	1	10	145	56	322,560	46	1	122½
3	17,280	2	7	217½	60	345,600	49	5	412½
4	23,040	3	4	290	70	403,200	57	9	262½
5	28,800	4	1	362½	80	460,800	65	13	112½
6	34,560	4	14	435	84	483,840	69	1	402½
7	40,320	5	12	70	90	518,400	74	0	400
8	46,080	6	9	142½	100	576,000	82	4	250
9	51,840	7	6	215	112	645,120	92	2	245
10	57,600	8	3	287½	224	1,290,240	184	5	52½
11	63,360	9	0	360	336	1,935,360	276	7	297½
12	69,120	9	13	432½	448	2,580,480	368	10	105
13	74,880	10	11	67½	560	3,225,600	460	12	350
14	80,640	11	8	140	1120	6,451,200	921	9	262½
15	86,400	12	5	212½	2240	12,902,400	1843	3	87½
16	92,160	13	2	285					

AVOIRDUPOIS WEIGHT in Grains and in Troy Equivalents.

Avoirdupois.	Grains.	Troy. lb.	oz.	drs.	grs.	Avoirdupois.	Grains.	Troy. lb.	oz.	dr.	gr.
Drachm	27·34375	0	0	0	0	Lb. 15	105,000	18	2	6	0
4	109·375	0	0	1	49·375	16	112,000	19	5	2	40
8	218·75	0	0	3	38·75	17	119,000	20	7	7	20
12	328·125	0	0	5	28·125	18	126,000	21	10	4	0
Oz. 1	437½	0	0	7	17½	19	133,000	23	1	0	40
2	875	0	1	6	35	20	140,000	24	3	5	20
3	1,312½	0	2	5	52½	21	147,000	25	6	2	0
4	1,750	0	3	5	10	22	154,000	26	8	6	40
5	2,187½	0	4	4	27½	23	161,000	27	11	3	20
6	2,625	0	5	3	45	24	168,000	29	2	0	0
7	3,062½	0	6	3	2½	25	175,000	30	4	4	40
8	3,500	0	7	2	20	26	182,000	31	7	1	20
9	3,937½	0	8	1	37½	27	189,000	32	9	6	0
10	4,375	0	9	0	55	28	196,000	34	0	2	40
11	4,812½	0	10	0	12½	29	203,000	35	2	7	20
12	5,250	0	10	7	30	30	210,000	36	5	4	0
13	5,687½	0	11	6	47½	40	280,000	48	7	2	40
14	6,125	1	0	6	5	50	350,000	60	9	1	20
15	6,562½	1	1	5	22½	56	392,000	68	0	5	20
Lb. 1	7,000	1	2	4	40	60	420,000	72	11	0	0
2	14,000	2	5	1	20	70	490,000	85	0	6	40
3	21,000	3	7	6	0	80	560,000	97	2	5	20
4	28,000	4	10	2	40	84	588,000	102	0	8	0
5	35,000	6	0	7	20	90	630,000	109	4	4	0
6	42,000	7	3	4	0	100	700,000	121	6	2	40
7	49,000	8	6	0	40	Cwt. 1	784,000	136	1	2	40
8	56,000	9	8	5	20	2	1,568,000	272	2	5	20
9	63,000	10	11	2	0	3	2,352,000	408	4	0	0
10	70,000	12	1	6	40	4	3,136,000	544	5	2	40
11	77,000	13	4	3	20	5	3,920,000	680	6	5	20
12	84,000	14	7	0	0	10	7,840,000	1361	1	2	40
13	91,000	15	9	4	40	Ton 1	15,680,000	2722	2	5	20
14	98,000	17	0	1	20						

The GOLD and SILVERSMITHS' DIVISIONS of the TROY WEIGHT.

OF THE POUND CARRACT.

1 Carract grain is 2½ dwts., or 1 drachm,	or	60	troy grains.
1 Carract is 4 carract grains, or ½ oz.,	or	240	,,
24 Carracts are 12 oz., or 1 lb. troy,	or	5,760	,,

OF THE OUNCE CARRACT.

1 Carract grain is 5 grains,	or	5	troy grains.
1 Carract is 4 carract grains,	or	20	,,
24 Carracts are 1 oz. troy,	or	480	,,

THE SMALLER DIVISIONS.

24 Blanks	make	1 Periot.		
20 Periots	,,	1 Droit.		
24 Droits	,,	1 Mite.		
20 Mites	,,	1 Grain, or	1	troy grain.
24 Grains	,,	1 Dwt., or	24	,,
20 Dwt.	,,	1 Ounce, or	480	,,
12 Ounces	,,	1 Pound, or	5,760	,,

MEASURES OF LENGTH.

Inches.	Feet.	Yards.	Poles or Perches.	Furlongs.	Miles.
1	0·083	0·027	0·0505	0·00012626	0·00001578282
12	1	0·333	0·6060	0·001515	0·000189393
36	3	1	0·1818	0·004545	0·000568181
192	16·5	5·5	1	0·025	0·003125
7920	660	220	40	1	0·125
63360	5280	1760	320	8	1

MEASURES OF SUPERFICIES.

Sq. Inch.	Square Feet.	Sq. Yards.	Square Poles.	Roods.	Acres.
1	0·00694	0·0007715	0·0000255076	0·0000006377	0·0000001594
144	1	0·11	0·0036730945	0·0000918274	0·0000229568
1296	9	1	0·0330578512	0·0008264463	0·0002066116
39204	272·25	30·25	1	0·025	0·00625
1568160	10890	1210	40	1	0·25
6272640	43560	4840	160	4	1

MEASURES OF CAPACITY.

Cubic inches.	Gill.	Pints.	Quarts.	Gallons.	Pecks.	Bushels.	Quarters.
8·6648076103	1	0·25	0·125	0·03125	0·015625	0·00390625	0·00048828125
34·6592304412	4	1	0·5	0·125	0·0625	0·015625	0·001953125
69·3184609825	8	2	1	0·25	0·125	0·03125	0·00390625
277·2738435700	32	8	4	1	0·5	0·125	0·015625
554·5476871400	64	16	8	2	1	0·25	0·03125
2218·1907485601	256	64	32	8	4	1	0·125
17751·2598848179	2048	512	256	64	32	8	1

LAND MEASURE.

7·92 inches ..	.. 1 link.
100 links, or 22 yards	.. 1 chain.
80 chains ..	.. 1 mile.
69·121 miles ..	.. 1 geo. degree.

SURFACE MEASURE.

62·7264 square inches	.. 1 square link.
10,000 square links	.. 1 sq. chain.
10 square chains ..	.. 1 acre.
640 acres	.. 1 square mile.

NAUTICAL MEASURE.

1 nautical mile	.. 6082·66 feet.
3 miles	.. 1 league.
20 leagues ..	.. 1 degree.
360 degrees ..	.. the earth's circumference.

SQUARE MEASURE.

144 square inches	.. 1 square foot.
9 square feet ..	.. 1 sq. yard.
30¼ square yards..	.. 1 square pole.
40 square poles ..	.. 1 rood.
4 roods, or 4840 sq. yds.	1 acre.

CUBIC MEASURE.

1728 cubic inches	.. 1 cubic foot.
27 cubic feet ..	.. 1 cubic yard.

Note.—A cubic foot is equal to 2200 cylindrical inches, or 3300 spherical inches, or 6600 conical inches.

LIQUID MEASURE.

8·665 cubic inches ..	.. 1 gill.
4 gills	.. 1 pint.
2 pints	.. 1 quart.
4 quarts, or 277·274 cub. in.	1 gallon.

DRY MEASURE.

2 gallons	.. 1 peck.
4 pecks, or 2218·192 cub. in.	1 bushel.
8 bushels	.. 1 quarter.
5 quarters	.. 1 load.

MISCELLANEOUS.

A cubic inch of distilled water at 62° F. weighs, in vacuo, 252·72 grs.; a cubic foot will therefore weigh 62·3862 lbs. avoirdupois. In air, a cubic inch weighs 252·458 grs., and a cubic foot 62·3206 lbs. An ounce of water = 1·73298 cubic inches.

Imperial gallon = 277·296 cubic inches, or 10 lbs.
Standard avoirdupois pound = 7,000 grs. troy.
,, troy pound = 5,860 grains troy.
,, gallon = 10 lbs. avoirdupois = 277·276 cubic inches.
,, quart = 2·5 lbs. avoirdupois.
,, pint = 1·25 lbs. avoirdupois = 20 oz. distilled water.
,, peck = 2 gallons.
,, bushel = 8 galls. = 80 lbs. avoirdupois of water.
,, 3 bushels = 1 sack.
,, 12 sacks = 1 chaldron.
,, perch = 16½ feet square.
,, rood = 1210 square yards.
,, acre = 4840 square yards = 160 square perches.

Load of unhewn timber ..	40 cubic ft.
Load of squared timber ..	50 —
Load of inch boards ..	600 sq. ft.
Load of two-inch planks ..	300 —
Hundred of deals	120 in numb.
Hundred of nails	120 —
Thousand of nails	1200 —
Load of bricks	500 —
Load of lime	32 bushels.
Load of sand	36 —
Sack of potatoes or coals ..	224 lbs.
Bushel of salt or flour ..	56 —
Bushel of wheat	60 —
Bushel of barley	50 —
Bushel of oats	40 —

A Spanish and Polish mile is about 3½ English. A Swedish, Danish, and Hungarian mile is from 5 to 6 English miles. A Russian mile, or verst, is about ¾ of an English mile, and the French toise is about 6 feet.

WEIGHTS and MEASURES.

FRENCH.

DECIMAL WEIGHTS and their EQUIVALENTS in ENGLISH.

	Equivalents in Grains.	TROY.				AVOIRDUPOIS.		
		lbs.	oz.	drs.	grs.	lbs.	oz.	Troy grains.
1 Myrio-gramme..	154340·234	26	9	4	20	22	0	340
1 Kilo-gramme ..	15434·023	2	8	1	14	2	3	121·5
1 Hecto-gramme..	1543·402	—	3	1	43	—	3	30·9
1 Deca-gramme ..	154·340	—	—	2	34	—	—	154·3
1 Gramme........	15·434	—	—	—	15·434	—	—	15·434
1 Deci-gramme ..	1·543	—	—	—	1·543	—	—	1·543
1 Centi-gramme ..	0·154	—	—	—	0·154	—	—	0·154
1 Mille-gramme ..	0·015	—	—	—	0·015	—	—	0·015

Compared with English Imperial Measures.

The metre, or unit of length=3·2809 imperial feet.

The are, or unit of square measure= 14 square yards.

The stere, or unit of solid measure= 35·31716 cubic feet.

The litre, or unit of measure for liquids, =61·028 cubic inches, or about ·453 of an imperial gallon.

The gramme, or unit of weight=15·438 troy grains, or ·002205 of a pound avoirdupois.

The kilogramme=2·205 pounds avoirdupois.

LONG MEASURE.

1 millimetre .. .. ·039371 imp. in.
10 millimetres .. .. 1 centimetre.
10 centimetres .. .. 1 decimetre.
10 decimetres .. .. 1 metre.
10 metres .. .. 1 decametre.
10 decametres .. .. 1 hectometre.
10 hectometres .. .. 1 kilometre.
10 kilometres .. .. 1 myriametre,
or 6 miles, 1 furlong, 28 poles, 2⅓ yards.

SURFACE MEASURE.

1 milliare .. .. .. 1196 sq. yds.
10 milliares .. .. .. 1 centiare.
10 centiares .. .. .. 1 deciare.
10 deciares .. .. .. 1 are.
10 ares .. .. .. 1 decare.
10 decares .. .. .. 1 hectare,
or 2·473614 imperial acres.

The are is a square decametre.

SOLID MEASURE.

1 millistere .. .. ·035317 cubic ft.
10 millisteres .. .. 1 centistere.
10 centisteres .. .. 1 decistere.
10 decisteres .. .. 1 stere.
10 steres .. .. 1 decastere.
10 decasteres .. .. 1 hectostere.
10 hectosteres .. .. 1 kilostere.
10 kilosteres .. .. 1 myriastere.

The stere is a cubic metre.

MEASURES or CAPACITY.

1 millilitre .. .. ·061028 cub. in.
10 millilitres .. .. 1 centilitre.
10 centilitres .. .. 1 decilitre.
10 decilitres .. .. 1 litre.
10 litres .. .. .. 1 decalitre.
10 decalitres .. .. 1 hectolitre.
10 hectolitres .. .. 1 kilolitre.
10 kilolitres .. .. 1 myrialitre.

The litre is a cubic decimetre.

MEASURES of WEIGHT.

1 milligramme .. ·015438 troy gr.
10 milligrammes .. 1 centigramme.
10 centigrammes .. 1 decigramme.
10 decigrammes .. 1 gramme.
10 grammes .. .. 1 decagramme.
10 decagrammes .. 1 hectogramme.
10 hectogrammes .. 1 kilogramme.
10 kilogrammes .. 1 myriagramme.

A gramme is the weight of a cubic centimetre of distilled water in vacuo at its maximum density, or at 39° Fahrenheit.

SYSTEME USUEL.

The toise usuelle=2 metres, or 6 feet 6¾ inches.

The pied=13⅛ inches.

The aune=12 decimetres, or 47¼ inches.

The litron=1¾ imperial pint, nearly.

The boisseau=1⅜ imperial peck.

The livre=7717 troy grains.

MEXICAN WEIGHTS.

12 Granos	1 Tomin					
36	3	1 Adarma				
72	6	2	1 Drachma			
576	48	16	8	1 Onza		
4,608	384	128	64	8	1 Marco	
9,216	768	256	128	16	2	1 Libra.

WEIGHTS used in MINING DISTRICTS.

25 lbs. Spanish	1 Arroba		
100	4	1 Quintal	
300	12	3	1 Carga

MAIZE or DRY MEASURE.

2 Quarterones	1 Quartillo					
4	2	1 Almud.				
12	6	3	1 Quartilla			
24	12	6	2	1 Media		
48	24	12	4	2	1 Anega	
96	48	24	8	4	2	1 Carga

COMPARATIVE WEIGHTS.

1 ounce Troy	contains	480	Grains English.
1 ,, Avoirdupois	,,	437½	,,
1 ,, Spanish	,,	444	,,
100 grains Mexican	equal to	$77\frac{1}{10}$	Grains Troy.

The Mexican league is 5,000 varas, equal to 13,760 feet English, or 2⅝ English miles.

ASSAY EQUIVALENTS.

Ounces per Quintal.		Marcs per Carga.		Marcs per Bolanos Monton, 15 Quintals.		Marcs per Zacatecas Mont, 20 Quintals.		Marcs per Real del Monte Mont, 30 Quintals.		Marcs per Guanaxuato Monton, 32 Quintals.	
oz.	dec.	m.	oz.	m.	oz.	m.	oz.	m.	oz.	m.	oz.
	1		3		1·5		2		3		3·2
	2		6		3·0		4		6		6·4
	3		9		4·5		6	1	1	1	1·6
	4		1·2		6·0	1	0	1	4	1	4·8
	5		1·5		7·5	1	2	1	7	2	0
	6		1·8	1	1	1	4	2	2	2	3·2
	7		2·1	1	2·5	1	6	2	5	2	6·4
	8		2·4	1	4	2	0	3	0	3	1·6
	9		2·7	1	5·5	2	2	3	3	3	4·8
1	0		3	1	7	2	4	3	6	4	0
2	0		6	3	6	5	0	7	4	8	0
3	0	1	1	5	5	7	4	11	2	12	0
4	0	1	4	7	4	10	0	15	0	16	0
5	0	1	7	9	3	12	4	18	6	20	0
6	0	2	2	11	2	15	0	22	4	24	0
7	0	2	5	13	1	17	4	26	2	28	0
8	0	3	0	15	0	20	0	30	0	32	0
9	0	3	3	16	7	22	4	33	6	36	0
10	0	3	6	18	6	25	0	37	4	40	0
15	0	5	5	28	1	37	4	56	2	60	0
20	0	7	4	37	4	50	0	75	0	80	0
25	0	9	3	46	7	62	4	93	6	100	0
30	0	11	2	56	2	75	0	112	4	120	0
35	0	13	1	65	5	87	4	131	2	140	0
40	0	15	0	75	0	100	0	150	0	160	0
45	0	16	7	84	3	112	4	168	6	180	0
50	0	18	6	93	6	127	0	187	4	200	0

WEIGHT of a SUPERFICIAL FOOT of various METALS in lbs.

Names.	Thickness by the Birmingham Wire Gauge.														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Iron.	12·50	12·00	11·00	10·00	8·74	8·12	7·50	6·86	6·24	5·62	5·00	4·38	3·75	3·12	2·82
Cop..	14·50	13·90	12·75	11·60	10·10	9·40	8·70	7·90	7·20	6·50	5·80	5·08	4·34	3·60	3·27
Brass	13·75	13·20	12·10	11·00	9·61	8·93	8·25	7·54	6·86	6·18	5·50	4·81	4·12	3·43	3·10
	Thickness by the Wire Gauge.														
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Iron.	2·50	2·18	1·86	1·70	1·54	1·40	1·25	1·12	1·00	·90	·80	·72	·64	·56	·5
Cop..	2·90	2·52	2·15	1·97	1·78	1·62	1·45	1·30	1·16	1·04	·92	·83	·74	·64	·58
Brass	2·75	2·40	2·04	1·87	1·69	1·54	1·37	1·23	1·10	·99	·88	·79	·70	·61	·55

Names.	Thickness in parts of an Inch.											
	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
Iron.	2·5	5·	7·5	10·	12·5	15·	17·5	20·	25·	30·	35·	40·
Cop..	2·9	5·8	8·7	11·6	14·5	17·4	20·3	23·2	28·9	34·7	40·4	46·2
Brass	2·7	5·5	8·2	10·9	13·6	16·3	19·0	31·8	27·1	32·5	37·9	43·3
Lead	3 7	7·4	11·1	14·8	18·5	22·2	25·9	29·6	37·0	44·4	57·8	59·2

The WEIGHT or PRESSURE which it is calculated a COLUMN of CAST IRON will sustain with safety.

Length or height in feet.	4	6	8	10	12	14	16	18	20	22	24
Diameter.	Weight in cwts.	Weight in cwts.	Weight in cwts.	Weight in cwts.	Weight in cwts.	Weight in cwts.	Weight in cwts.	Weight in cwts.	Weight in cwts.	Weight in cwts.	Weight in cwts.
In.											
2½	119	105	91	77	65	55	47	40	34	29	25
3	178	163	145	128	111	97	84	73	64	56	49
3½	247	232	214	191	172	156	135	119	106	94	83
4	326	310	288	266	242	220	198	178	160	144	130
4½	418	400	379	354	327	301	275	251	229	208	189
5	522	501	479	452	427	394	365	337	310	285	262
6	607	592	573	550	525	497	469	440	413	386	360
7	1032	1013	989	959	924	887	848	808	765	725	686
8	1333	1315	1289	1259	1224	1185	1142	1097	1052	1005	959
9	1716	1697	1672	1640	1603	1561	1515	1467	1416	1364	1311
10	2119	2100	2077	2045	2007	1964	1916	1865	1811	1755	1697
11	2570	2550	2520	2490	2450	2410	2358	2305	2248	2189	2127
12	3050	3040	3020	2970	2930	2900	2830	2780	2730	2670	2600

The relative strength of cast iron being assumed as 1·—, steel will give 2·518, and wrought iron 1·745.

WEIGHT of LEAD PIPES.

Bore, in Inches.	Length, in feet.	Weight of each Length, in lbs.		
		Common.	Middling.	Strong.
½	15	16		
¾	15	24	27	30
1	15	30	40	43
1¼	12	36	44	53
1½	12	48	56	67
2	10	56	70	83
2½	10	70	86	100

WEIGHT of COPPER PIPES, 12 Inches in Length and ⅛ of an Inch in the Knees.

	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.
Diameter of Bore....	½	¾	1	1¼	1½	1¾	2	2½	3
Weight, in lbs.......	0·94	1·33	1·69	2·08	2·42	2·87	3·21	3·97	4·78

WEIGHT of A LINEAL FOOT of CAST-IRON PIPES, in POUNDS.

Diameter of bore, in inches.	Thickness of the Metal, in Inches.							
	⅜	½	⅝	¾	⅞	1	1⅛	1¼
2	8·8	12·3	16·1	20·3				
2½	10·6	14·7	19·2	23·9				
3	12·4	17·2	22·2	27·6	33·3	39·3	45·6	
3½	14·2	19·6	25·3	31·3	37·6	44·2	51·1	
4	16·1	22·1	28·4	35·0	41·9	49·1	56·6	64·4
4½	18·0	24·5	31·4	38·7	46·2	54·0	62·1	70·6
5	19·8	27·0	34·5	42·3	50·5	58·9	67·6	76·7
5½	21·6	29·5	37·6	46·0	54·8	63·8	73·2	82·8
6	23·5	31·9	40·7	49·7	59·1	68·7	78·7	88·8
6½	25·3	34·4	43·7	53·4	63·4	73·4	84·2	95·1
7	27·2	36·8	46·8	56·8	67·7	78·5	89·7	101·2
7½	29·0	39·1	49·9	60·7	72·0	83·5	95·3	107·4
8	30·8	41·7	52·9	64·4	76·2	88·4	100·8	113·5
8½	32·9	44·4	56·2	68·3	80·8	93·5	106·5	119·9
9	34·5	46·6	59·1	71·8	84·8	98·2	111·8	125·8
9½	36·3	49·1	62·1	75·5	89·1	103·1	117·4	131·9
10	38·2	51·5	65·2	79·2	93·4	108·0	122·8	138·1
10½	..	54·0	68·2	82·8	97·7	112·9	128·4	144·2
11	..	56·4	71·3	86·5	102·0	117·8	133·9	150·3
11½	..	58·9	74·3	90·1	106·3	122·7	139·4	156·4
12	..	61·3	77·4	93·6	110·6	127·6	145·0	162·6
13	..	..	82·7	101·2	118·2	137·4	154·1	173·5
14	..	..	89·3	108·2	126·5	146·2	165·3	185·2
15	..	..	95·2	115·7	135·3	156·2	176·2	198·1
16	..	..	..	123·3	143·1	166·1	187·5	211·3
17	..	..	..	130·2	152·5	178·5	198·2	223·4
18	..	..	..	137·0	161·2	185·3	209·1	235·6
19	..	..	..	..	169·2	195·7	222·3	247·1
20	..	..	..	..	178·1	205·2	233·2	259·0

The two flanges of a pipe are considered as equal to the weight of one foot in length.

PROGRESSIVE DILATATION of METALS by HEAT, the Length at 62° Fahrenheit being 1000000.

Name of Metal.	At 212° Fahr.	At 662° Fahr.	Fusing Point.
Platinum	1000735	1002995	1009926
Iron, wrought	1000984	1004483	1018378
Iron, cast	1000893	1003943	1016389
Gold	1001025	1004238	
Copper	1001430	1006347	1024376
Silver	1001626	1006886	1020640
Zinc	1002480	1008527	1012621
Lead	1002323	..	1009072
Tin	1001472	..	1003798

POWER of METALS for CONDUCTING HEAT.

Gold ..	.. 1000	Platinum ..	.. 381	Tin ..	.. 303·9
Silver ..	.. 973	Iron ..	.. 374·3	Lead ..	.. 179 6
Copper ..	.. 898·2	Zinc ..	.. 363		

EFFECTS of HEAT on different METALS.

	Fahr.	Wedg.		Fahr.	Wedg.
	Deg.	Deg.		Deg.	
Extrem. of Wedgwood's Scale ..	32277	240	Lead melts	612	
			Mercury boils	600	
Platinum melts ..	23177	170	Bismuth melts ..	476	
Wrought Iron fuses ..	21637	158	Tin 1, and lead 4, melts	460	
Cast Iron melts ..	17977	130	Tin melts	442	
Welding Heat of Bar Iron	13420	94	Tin 3, and lead 2, or tin 2, and bismuth 1, melts	334	
Fine Gold melts ..	5237	32			
Fine Silver melts ..	4717	28	Tin and bismuth, equal parts, melts	283	
Copper melts	4587	27			
Brass melts	3807	21	Bismuth 5, tin 3, and lead 2, melts ..	212	
Iron red-hot in daylight	1207	1			

ORDER of METALS of DUCTILITY.

Wire-drawing Ductility.	Laminable Ductility.
Gold ; Silver ; Platinum ; Iron, wrought ; Copper ; Zinc ; Tin ; Lead.	Gold ; Silver ; Copper ; Tin ; Platinum ; Lead ; Zinc ; Iron, wrought.

WEIGHT of MODULUS of ELASTICITY of various METALS.

Metal.	Elasticity in lbs.	Metal.	Elasticity in lbs.
Steel	29,000,000	Gun Metal	9,873,000
Wrought Iron	24 920,000	Brass	8,930,000
Cast Iron	18,400,000	Tin	4,608,000
Zinc	12,680,000	Lead	720,000

Note.—The modulus of elasticity for oak is 1,714,500, and for cast iron 18,400.000, or 10 7 times that of oak ; hence, cast iron is 10·7 times as stiff as a piece of oak of equal dimensions and bearing.

TABLE of SPECIFIC GRAVITY.

METALS.				STONES, EARTHS, &c.			
Names.	Weight, water being 1000.	Number of cubic inches in a lb.	Weight of a cubic inch, in lbs.	Names.	Weight, water being 1000.	Weight of a cubic foot, in lbs.	Number of cubic feet in a ton.
Platina	19500	1·417	·7053	Marble, average ..	2720	170·00	13
Pure Gold	19258	1·435	·6965	Granite, ditto ..	2651	165·68	13½
Mercury	13560	2·038	·4904	Purbeck Stone ..	2601	162·56	13¾
Lead	11352	2·435	·4105	Portland ditto ..	2570	160·62	14
Pure Silver	10474	2·638	·3788	Bristol ditto ..	2554	159·62	14
Bismuth	9823	2·814	·3552	Millstone	2484	155·25	14½
Copper, cast	8788	3·146	·3178	Paving Stone ..	2415	150·93	14¾
— sheet ..	8910	3·103	·3225	Craigleith ditto ..	2362	147·62	15
Brass, cast	7824	3·533	·3036	Grindstone	2143	133·93	16¾
— sheet	8396	3·293	·3037	Chalk, British ..	2781	173·81	12¾
Iron, cast	7264	3·806	·263	Brick..	2000	125·00	17
— bar	7700	3·592	·279	Coal, Scotch ..	1300	81·15	27½
Steel, soft	7833	3·530	·2833	— Newcastle ..	1270	79·37	28¼
— hard	7816	3·537	·2827	— Staffordshire..	1240	77·50	29
Tin, cast	7291	3·790	·2636	— Cannel ..	1238	77·37	29
Zinc, cast	7190	3·845	·26				

EXPANSION of SOLIDS by increasing the Temperature from 32° to 212°, the Length of the Bar being 1·0000000.

Glass tube	1·00082800	Gold	1·00150000
Platinum	1·00088420	Lead	1·00286700
Antimony	1·00108300	Brass	1·00186671
Cast Iron	1·00111111	Wrought Iron	1·00125800
Steel	1·00118999	Zinc	1·00294200
Blistered Steel	1·00112500	Spelter solder, brass 2, zinc 1	1·00205800
Steel, hardened	1·00122500	Soft solder, lead 2, tin 1 ..	1·00250800
Bismuth	1·00139200	Copper 8, tin 1	1·00181700
Silver	1·00189000	Palladium	1·00100000
Tin	1·00217298		

EXPANSION and DENSITY of WATER at various Degrees of Temperature.

Sp. Gr.	Bulk of Water.	Maximum Density 39°.		Bulk of Water.	Sp. Gr.
		Deg.	Deg.		
1·00000	1·00000	38	40	1·00000	1·00000
0·99999	1·00001	37	41	1·00001	0·99999
0·99998	1·00002	36	42	1·00002	0·99998
0·99996	1·00004	35	43	1·00004	0·99996
0·99994	1·00006	34	44	1·00006	0·99994
0·99991	1·00008	33	45	1·00008	0·99991
0·99988	1·00012	32	46	1·00012	0·99988

Note.—The expansion of water is the same for any number of degrees above or below the maximum of density; but the law of maximum of density does not prevail in the case of sea-water, but, on the contrary, is found gradually to increase in weight down to the freezing point.

RELATIVE STRENGTH of BODIES to RESIST TORSION.

Lead ..	1·0	Gun-metal ..	5·0	Blistered Steel	16·6
Tin ..	1·4	Cast Iron ..	9·0	Shear Steel ..	17·0
Copper ..	4·3	Swedish Iron	9·5	Cast Steel ..	19·5
Yellow Brass..	4·6	English Iron	10·1		

RELATIVE WEIGHT and STRENGTH of ROPES and CHAINS.

Circum. of Rope, in in.	Weight per fathom, in lbs.	Diameter of Chain, in in.	Weight per fathom, in lbs.	Proof strength in tons	& cwts.	Circum. of Rope, in in.	Weight per fathom, in lbs.	Diameter of Chain, in in.	Weight per fathom, in lbs.	Proof strength in tons	& cwts.
$3\frac{1}{2}$	$2\frac{3}{4}$	$\frac{5}{16}$	$5\frac{1}{2}$	1	$5\frac{1}{2}$	10	23	$\frac{7}{8}$	43	10	0
$4\frac{1}{4}$	$4\frac{3}{4}$	$\frac{3}{8}$	8	1	$16\frac{3}{4}$	$10\frac{3}{4}$	28	$\frac{15}{16}$	49	11	11
5	$5\frac{3}{4}$	$\frac{7}{16}$	$10\frac{1}{2}$	2	10	$11\frac{1}{2}$	$30\frac{1}{2}$	1	56	13	8
$5\frac{3}{4}$	7	$\frac{1}{2}$	14	3	$5\frac{1}{2}$	$12\frac{1}{4}$	36	$1\frac{1}{16}$	63	14	18
$6\frac{1}{2}$	$9\frac{3}{4}$	$\frac{9}{16}$	18	4	$3\frac{1}{2}$	13	39	$1\frac{1}{8}$	71	16	14
7	$11\frac{1}{4}$	$\frac{5}{8}$	22	5	2	$13\frac{3}{4}$	45	$1\frac{3}{16}$	79	18	11
8	15	$\frac{11}{16}$	27	6	$4\frac{1}{2}$	$14\frac{1}{2}$	$48\frac{1}{2}$	$1\frac{1}{4}$	87	20	8
$8\frac{3}{4}$	19	$\frac{3}{4}$	32	7	7	$15\frac{1}{4}$	56	$1\frac{5}{16}$	96	22	13
$9\frac{1}{2}$	21	$\frac{13}{16}$	37	8	$13\frac{1}{2}$	16	60	$1\frac{3}{8}$	106	24	18

COMPARATIVE STRENGTH, SIZE, and WEIGHT of IRON-WIRE ROPE, HEMPEN ROPE, and IRON CHAIN.

Breaking weight, in tons.	Description.	Size in inches.	Weight per fathom. lbs.	oz.
4	Wire rope	1 circum.	0	12
	Hempen rope	2 do.	1	1
	Chain	$\frac{1}{4}$ diam.	3	0
8	Wire rope	2 circum.	2	10
	Hempen rope	5 do.	6	0
	Chain	$\frac{1}{2}$ diam.	16	0
12	Wire rope	$2\frac{1}{2}$ circum.	4	8
	Hempen rope	7 do.	12	3
	Chain	$\frac{11}{16}$ diam.	27	0
16	Wire rope	3 circum.	6	12
	Hempen rope	8 do.	14	3
	Chain	$\frac{13}{16}$ diam.	36	0
20	Wire rope	$3\frac{1}{2}$ circum.	9	4
	Hempen rope	9 do.	19	6
	Chain	$\frac{29}{32}$ diam.	46	0
24	Wire rope	4 circum.	12	4
	Hempen rope	10 do.	25	0
	Chain	$\frac{31}{32}$ diam.	53	0
30	Wire rope	$4\frac{1}{2}$ circum.	16	5
	Hempen rope	11 do.	30	0
	Chain	$1\frac{1}{16}$ diam.	62	0
36	Wire rope	5 circum.	22	5
	Hempen rope	$12\frac{1}{2}$ do.	35	10
	Chain	$1\frac{3}{16}$ diam.	78	0
44	Wire rope	$5\frac{1}{2}$ circum.	27	0
	Hempen rope	14 do.	41	10
	Chain	$1\frac{5}{16}$ diam.	96	0
54	Wire rope	6 circum.	34	0
	Hempen rope	15 do.	47	8
	Chain	$1\frac{7}{16}$ diam.	115	0

DEPTHS of SQUARE BARS of CAST IRON, calculated to support from 1 Cwt. to 14 Tons in the Centre, the Deflexion not exceeding one-fortieth of an Inch each Foot in Length.

Lengths in Feet.		10	12	14	16	18	20	22	24	26	28	30
Weight in cwt.	Weight in lbs.	Depth.	Depth.	Depth.	Depth.	Depth.	Depth.	Depth.	Depth.	Depth.	Depth.	Depth.
		In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
1 cwt.	112	1·9	2·0	2·2	2·4	2·5	2·6	2·7	2·9	3·0	3·1	3·2
2	224	2·2	2 4	2·6	2·8	3·0	3·1	3·3	3·4	3·6	3·7	3·8
3	336	2·4	2·7	2·9	3·1	3·3	3·4	3·6	3·8	3·9	4·1	4·2
4	448	2·6	2·9	3·1	3·3	3·5	3·7	3·9	4·0	4·2	4·3	4·5
5	560	2·8	3·0	3·3	3·5	3·7	3·9	4·1	4·3	4·4	4·6	4·8
10	1,120	3·3	3·6	3·9	4·2	4·4	4·7	4·9	5·2	5·3	5·4	5·7
15	1,680	3·6	4·0	4·3	4·6	4·9	5·2	5·4	5·6	5·8	6·1	6·2
1 ton	2,240	3·9	4·3	4·6	4·9	5·2	5·5	5·8	6·0	6·3	6·5	6·8
1¼	2,800	4·1	4·5	4·9	5·2	5·5	5·8	6·1	6·4	6·6	6·9	7·2
1½	3,360	4·3	4·7	5·1	5·5	5·8	6·1	6·4	6·7	7·0	7·2	7·5
1¾	3,920	4·5	4·9	5·3	5·7	6·0	6·3	6·7	6·9	7·2	7·5	7·7
2	4,480	4·7	5·1	5·5	5·9	6·2	6·5	6·8	7·2	7·6	7·7	8·0
2½	5,600	4·9	5·5	5·8	6·2	6·6	6·9	7·3	7·6	7·9	8·2	8·5
3	6,720	5·1	5·7	6·1	6·5	6·9	7·3	7·6	7·9	8·3	8·6	8·9
3½	7,840	5·3	5·8	6·3	6·7	7·1	7·5	7·9	8·2	8·6	8·9	9·2
4	8,960	5·5	6·0	6·5	7·0	7·4	7·8	8·2	8·5	8·9	9·2	9·5
5	11,200	5·8	6·4	6·9	7·4	7·8	8·2	8·6	9·0	9·4	9·7	10·1
6	13,440	6·1	6·7	7·2	7·7	8·2	8·6	9·0	9 4	9·8	10·2	10·5
7	15,680	6·3	6·9	7·5	8·0	8·5	8·9	9·4	9·8	10·2	10·6	11·0
8	17,920	6·6	7·2	7·8	8·3	8·8	9·3	9·7	10·1	10·6	10·9	11·3
9	20,160	6·8	7·4	8·0	8·5	9·0	9·5	10·0	10·4	10·9	11·3	11·7
10	22,400	6·9	7·6	8·2	8·8	9·3	9·8	10·3	10·7	11·2	11·6	12·0
15	33,600	7·7	8·4	9·1	9·7	10·3	10·8	11·4	12·3	12·8	13·2	13·7
20	44.800	..	9·0	9·7	10·4	11·0	11·6	12·5	12·7	13·2	13·8	14·2
30	67,200	..	..	10·8	11·5	12·2	12·9	13·5	14·1	14·7	15·2	15·7
40	89,600	..	..	..	12·4	13·1	13·8	14·5	15·1	15·7	16·4	16·9
50	112,000	..	..	..	..	13·8	14·6	15·3	16·0	16·6	17·3	17·9
60	134,000	..	..	..	..	14·5	15·3	16·0	16·7	17·4	18·1	18·7
Deflexion in inches		·25	·3	·35	·4	·45	·5	·55	·6	·65	·7	·75

Examples.—1. To find the depth of a rectangular bar of cast iron to support a weight of 10 tons in the middle of its length, the deflexion not to exceed $\frac{1}{40}$ of an inch per foot in length, and its length 20 feet, also let the depth be 6 times the breadth.

Opposite 6 times the weight and under 20 feet in length is 15·3 inches the depth, and $\frac{1}{6}$ of 15·3=2·6 inches the breadth.

2. To find the diameter for a cast-iron shaft or solid cylinder that will bear a given pressure, the flexure in the middle not to exceed $\frac{1}{40}$ of an inch for each foot of its length, the distance of the bearings being 20 feet, and the pressure on the middle equals 10 tons.

Constant multiplier 1·7 for round shafts, then 10×1·7=17. And opposite 17 tons and under 20 feet is 11·2 inches for the diameter.

But half that flexure is quite enough for revolving shafts: hence 17×2=34 tons; and opposite 34 tons is 13·3 inches for the diameter.

The above calculations of the strength of cast-iron bars are founded on experiments by Mr. Hodgkinson, of Manchester, and are extracted from his new edition of Tredgold.—(*Abstract of Table, Weale's Engineer's Pocket-book.*)

WEIGHT of a LINEAL FOOT of FLAT BAR IRON, in lbs.

Breadth in inches.	Thickness, in parts of an inch. ¼	5/16	⅜	7/16	½	⅝	¾	⅞	1
1	·835	1·044	1·253	1·461	1·670	2·088	2·506	2·923	3·340
1⅛	·939	1·174	1·409	1·644	1·878	2·348	2·818	3·287	3·756
1¼	1·044	1·305	1·566	1·826	2·088	2·609	3·132	3·653	4·176
1⅜	1·148	1·435	1·722	2·009	2·296	2·870	3·444	4·018	4·592
1½	1·252	1·566	1·879	2·192	2·504	3·131	3·758	4·384	5·008
1⅝	1·358	1·696	2·035	2·374	2·716	3·392	4·070	4·749	5·432
1¾	1·462	1·827	2·192	2·557	2·924	3·653	4·384	5·114	5·848
1⅞	1·566	1·957	2·348	2·740	3·132	3·914	4·696	5·479	6·264
2	1·671	2·088	2·505	2·922	3·342	4·175	5·010	5·845	6·684
2⅛	1·775	2·218	2·662	3·105	3·550	4·435	5·324	6·210	7·100
2¼	1·880	2·348	2·818	3·288	3·760	4·696	5·636	6·575	7·520
2⅜	1·984	2·479	2·975	3·470	3·968	4·957	5·950	6·941	7·936
2½	2·088	2·609	3·131	3·653	4·176	5·218	6·262	7·306	8·352
2⅝	2·193	2·740	3·288	3·836	4·386	5·479	6·576	7·671	8·772
2¾	2·297	2·870	3·444	4·018	4·594	5·740	6·888	8·036	9·188
2⅞	2·402	3·001	3·601	4·201	4·804	6·001	7·202	8·402	9·608
3	2·506	3·131	3·758	4·384	5·012	6·262	7·516	8·767	10·024

WEIGHT of a LINEAL FOOT of SQUARE and ROUND BAR IRON.

Side & diameter, in inches.	Square, in lbs.	Number of lineal feet in 1 cwt.	Round, in lbs.	Number of lineal feet in 1 cwt.	Side & diameter, in inches.	Square, in lbs.	Number of lineal feet in 1 cwt.	Round, in lbs.	Number of lineal feet in 1 cwt.
¼	·209	536	·164	683	3⅛	32·618	3½	25·620	4¼
5/16	·326	343½	·256	437½	3¼	35·279	3	27·709	4
⅜	·470	238	·369	303½	3⅜	38·045	3	29·881	3¾
7/16	·640	175	·503	224½	3½	40·916	2¾	32·170	3½
½	·835	134	·656	170¾	3⅝	43·890	2½	34·472	3¼
9/16	1·057	106	·831	134¾	3¾	46·969	2¼	36·895	3
⅝	1·305	86	1·025	109¼	3⅞	50·153	2¼	39·390	2¾
11/16	1·579	71	1·241	90¼	4	53·440	2	41·984	2½
¾	1·879	59½	1·476	76	4⅛	56·833	2	44·637	2½
13/16	2·205	51	1·732	64½	4¼	60·329	1¾	47·385	2¼
⅞	2·558	44	2·011	55½	4⅜	63·930	1¾	50·211	2¼
15/16	2·936	38	2·306	48½	4½	67·637	1½	53·132	2⅛
1	3·340	33½	2·624	42½	4⅝	71·445	1½	56·113	2
1⅛	4·228	26½	3·321	33¾	4¾	75·359	1½	59·187	1¾
1¼	5·219	21½	4·099	27½	4⅞	79·378	1¼	62·344	1¾
1⅜	6·315	17¾	4·961	22½	5	83·510	1¼	65·585	1½
1½	7·516	15	5·913	19	5¼	92·459	1¼	72·618	1½
1⅝	8·820	12¾	6·928	16⅛	5½	101·036	1⅛	79·370	1½
1¾	10·229	11	8·043	14	5¾	110·429	1	86·731	1¼
1⅞	11·743	9½	9·224	12½	6	120·243		94·610	1⅛
2	13·360	8¼	10·496	10½					
2⅛	15·083	7½	11·846	9½					
2¼	16·909	6¾	13·283	8½					
2⅜	18 840	6	14·797	7½					
2½	20·875	5¼	16·396	6¾					
2⅝	23·115	5	18·146	6⅛					
2¾	25·259	4½	19·842	5½					
2⅞	27·608	4	21·684	5⅛					
3	30·070	3¾	23·653	4¾					

NOTE.—The weight of bar iron being 1;

The weight of cast iron		=	·95
—	steel	=	1·02
—	copper	=	1·16
—	brass	=	1.09
—	lead	=	1·48

TABLE of the WEIGHT of TIN PLATES as manufactured in England.

	Brand Mark.	Number f Sheets per Box.	Length and Breadth.			Weight per Box.		
			In.		In.	cwt.	qrs.	lbs.
One Box of	1 C or 1 Com. ..	225	13¾	by	10	1	0	0
	2 C	225	13¼	,,	9¾	0	3	21
	3 C	225	12¾	,,	9½	0	3	14
	H C	225	13¾	,,	10	1	0	7
	H X	225	13¾	,,	10	1	1	7
	1 X	225	13¾	,,	10	1	1	0
	2 X	225	13¼	,,	9¾	1	0	21
	3 X	225	12¾	,,	9½	1	0	14
	1 XX	225	13¾	,,	10	1	1	21
	1 XXX	225	13¾	,,	10	1	2	14
	1 XXXX	225	13¾	,,	10	1	3	7
	DC	100	16¾	,,	12½	0	3	21
	DX	100	16¾	,,	12½	1	0	14
	DXX	100	16¾	,,	12½	1	1	7
	DXXX	100	16¾	,,	12½	1	2	0
	DXXXX	100	16¾	,,	12½	1	2	21
	SDC	200	15	,,	11	1	2	0
	SDX	200	15	,,	11	1	2	21
	SDXX	200	15	,,	11	1	3	14
	SDXXX	200	15	,,	11	2	0	7
	SDXXXX	200	15	,,	11	2	1	0
	Wasters or Wc and X mixed	225	13¾	,,	10	1	0	14
	TT	450	13¾	,,	10	1	0	0
	XTT	450	13¾	,,	10	1	0	14

CUBICAL CONTENTS of 11-inch Planks, 9-Inch Deals, and 7-inch Battens, of 2½ and 3 Inches in thickness.

Length in feet.	Planks, 11 by 2½ in.	Planks 11 by 3 in.	Deals, 9 by 2½ in.	Deals, 9 by 3 in.	Battens, 7 by 2½ in.	Battens, 7 by 3 in.
	ft. in. pts.	ft. in. pts.	ft. in. pts.	ft. in. pts.	ft. in. pts.	ft. in. pts.
8	1 6 4	1 10 0	1 3 0	1 6 0	0 11 8	1 2 0
10	1 10 11	2 3 6	1 6 9	1 10 6	1 2 7	1 5 6
12	2 3 6	2 9 0	1 10 6	2 3 0	1 5 6	1 9 0
14	2 8 1	3 2 6	2 2 3	2 7 6	1 8 5	2 0 6
16	3 0 8	3 8 0	2 6 0	3 0 0	1 11 4	2 4 0
18	3 5 3	4 1 6	2 9 9	3 4 6	2 2 3	2 7 6
20	3 9 10	4 7 0	3 1 6	3 9 0	2 5 2	2 11 0
	Number of each to equal a Load of 50 cubic feet.					
8	32¾	27¼	40	33⅓	51½	43
10	26¼	22	32	26⅔	41¼	34¾
12	22	18¼	26¾	22¼	34¼	28¾
14	18¾	15¾	23	19	29½	24½
16	16¼	13¾	20	16¾	25¾	21½
18	14½	12¼	17¾	15	23	19
20	13	11	16	13⅓	20¾	16¾

TABLE of the AREAS of CYLINDERS.

Diameter of Cylinder.	Area of Cylinder.	Diameter of Cylinder.	Area of Cylinder.
Inches.	Square Inches.	Inches.	Square Inches.
9	63·58	12½	122·65
10	78·5	13	132·66
10½	86·56	13	143·02
11	95·01	14	153·96
11½	103·84	14½	165·04
12	113·07	15	176·62

Note.—The areas of cylinders are as the squares of their diameters.

The diameter of a circle being 1, its circumference equals 3·1416.

The square of the diameter of a circle being 1, its area equals ·7854.

The circumference of a cylinder, multiplied by its length or height, equals its convex surface.

The area of the end of a cylinder, multiplied by its length, equals its solid contents.

The area of the internal diameter of a cylinder, multiplied by its depth, equals its cubical capacity.

The square of the diameter of a cylinder, multiplied by its length and divided by any other required length, the square root of the quotient equals the diameter of the other cylinder of equal contents or capacity.

The capacity of a cylinder 1 foot in diameter and 1 foot in length, equals 4·895 imperial gallons.

The capacity of a cylinder 1 inch in diameter and 1 foot in length, equals ·034 of an imperial gallon.

The capacity of a cylinder 1 inch in diameter and 1 inch in length, equals ·002832 of an imperial gallon.

The capacity of any cylinder in imperial gallons is obtained by multiplying the square of its diameter by its length, or the capacity of any other sphere by the cube of its diameter, and by the number of imperial gallons contained as above in the unity of its measurement.

TABLE of the PROPORTIONS of HEATING SURFACE and AREA of FIRE-GRATE compared with the quantity of water evaporated, and of fuel consumed, in the Cornish and Boulton and Watt boilers.

	Place.	Number of boilers.	Boiler surface exposed to fire and flues. Per square foot of fire-grate.	Per lb. of water evaporated per hour.	Per lb. of fuel consumed per hour.	Weight of fuel burnt per square foot of grate per hour.
			sq. ft.	sq. ft.	sq. ft.	lbs.
Boulton & Watt boilers	Albion Mills....	1	21·28	0·15	1·294	16·44
	Old Ford	1	15·78	0·163	1·3	12·21
Cornish boilers	Wheal Towan..	3	36·11	1·205	12·75	2·83
	United Mines...	3	43·88	1·022	10·72	4·09
	Old Ford	4	43·7	1·56	13·1	3·64

By this table it appears, that in the Cornish boiler,

1st. The ratio of the area of the heating surface to that of the fire-grate is more than twice as great as in the common boiler.

2nd. The proportion of heating surface to the quantity of water evaporated, or of fuel consumed, in a given time, is about ten times as great.

3rd. The rate of combustion is slower with the Cornish boiler than with the common one, in the proportion of about 1 to 4.

One pound of steam will raise 3,657 cubic feet of air 10°, and cause it to expand from 32° to 42°, about 3,733 cubic feet.

The heat that would raise 1 pound of water 1° would raise a pound of air 3·7°:—one pound of air = about 11 cubic feet.—(*Weale's Engineer's Pocket-Book.*)

TABLE of GRADIENTS.

Rise		Inclination.	Rise		Inclination.	Rise		Inclination.
Per mile.	Per chain.		Per mile.	Per chain.		Per mile.	Per chain.	
ft.	in.	1 in.	ft.	in.	1 in.	ft.	in.	1 in.
1	·15	5280	21	3·15	251·4	41	6·15	128·8
2	·30	2640	22	3·30	240	42	6·30	125·7
3	·45	1760	23	3·45	229·5	43	6·45	122·8
4	·60	1320	24	3·60	220	44	6·60	120
5	·75	1056	25	3·75	211·2	45	6·75	117·3
6	·90	880	26	3·90	203·1	46	6·90	114·8
7	1·05	754·2	27	4·05	195·5	47	7·05	112·3
8	1·20	660	28	4·20	188·6	48	7·20	110
9	1·35	586·6	29	4·35	182·1	49	7·35	107·7
10	1·50	528	30	4·50	176	50	7·50	105·6
11	1·65	480	31	4·65	170·3	51	7·65	103·5
12	1·80	440	32	4·80	165	52	7·80	101·5
13	1·95	406·1	33	4·95	160	53	7·95	99·6
14	2·10	377·1	34	5·10	155·3	54	8·10	97·8
15	2·25	352	35	5·25	150·8	55	8·25	96
16	2·40	330	36	5·40	146·6	56	8·40	94·3
17	2·55	310·6	37	5·55	142·7	57	8·55	92·6
18	2·70	293·3	38	5·70	138·9	58	8·70	91
19	2·85	277·9	39	5·85	135·4	59	8·85	89·5
20	3·00	264	40	6·00	132	60	9·00	88

MAGNETIC DECLINATION, or VARIATION of the COMPASS.

Two volumes of the Greenwich Magnetical and Meteorological Observations for the years 1845 and 1846 have been published, from which it appears that the following were the monthly values of the westerly declination, deduced from two-hourly observations made during the day and night, in the years 1845 and 1846.

1845.				1846.			
January	22°	58′	6″	January	22°	50′	56″
February	22	57	20	February	22	50	17
March	22	57	6	March	22	49	21
April..	22	59	14	April..	22	51	51
May	22	57	28	May	22	49	32
June..	23	1	10	June..	22	51	48
July	22	57	24	July	22	49	24
August	22	58	11	August	22	49	33
September	22	56	7	September	22	48	55
October	22	53	21	October	22	47	55
November	22	52	53	November	22	47	38
December	22	52	18	December	22	47	51

The mean westerly declination for the year 1845 was 22° 56′ 43″, and that for the year 1846 was 22° 49′ 35″. The decrease from the year 1844 to 1845 was 18′ 36″; and that from the year 1845 to 1846 was 7′ 8″.

COMPARATIVE TABLE OF WEIGHTS AND MEASURES.

The Newcastle Statute Coal Measure converted into Weight.

Chals.	Tons.	Cwt.	Chals.	Tons.	Cwt.	Chals.	Tons.	Cwt.	Chals.	Tons.	Cwt.
1	2	13	33	87	9	65	172	5	97	257	1
2	5	6	34	90	2	66	174	18	98	259	14
3	7	19	35	92	15	67	177	11	99	262	7
4	10	12	36	95	8	68	180	4	100	265	0
5	13	5	37	98	1	69	182	17	101	267	13
6	15	18	38	100	14	70	185	10	102	270	6
7	18	11	39	103	7	71	188	3	103	272	19
8	21	4	40	106	0	72	190	16	104	275	12
9	23	17	41	108	13	73	193	9	105	278	5
10	26	10	42	111	6	74	196	2	106	280	18
11	29	3	43	113	19	75	198	15	107	283	11
12	31	16	44	116	12	76	201	8	108	286	4
13	34	9	45	119	5	77	204	1	109	288	17
14	37	2	46	121	18	78	206	14	110	291	10
15	39	15	47	124	11	79	209	7	111	294	3
16	42	8	48	127	4	80	212	0	112	296	16
17	45	1	49	129	17	81	214	13	113	299	9
18	47	14	50	132	10	82	217	6	114	302	2
19	50	7	51	135	3	83	219	19	115	304	15
20	53	0	52	137	16	84	222	12	116	307	8
21	55	13	53	140	9	85	225	5	117	310	1
22	58	6	54	143	2	86	227	18	118	312	14
23	60	19	55	145	15	87	230	11	119	315	7
24	63	12	56	148	8	88	233	4	120	318	0
25	66	5	57	151	1	89	235	17	125	331	5
26	68	18	58	153	14	90	238	10	130	344	10
27	71	11	59	156	7	91	241	3	135	357	15
28	74	4	60	159	0	92	243	16	140	371	0
29	76	17	61	161	13	93	246	9	145	384	5
30	79	10	62	164	6	94	249	2	150	397	10
31	82	3	63	166	19	95	251	15			
32	84	16	64	169	12	96	254	8			

The London Imperial Coal Measure converted into Weight.

Chals.	Tons.	Cwt.	Chals.	Tons.	Cwt.	Chals.	Tons.	Cwt.	Chals.	Tons.	Cwt.
1	1	5½	33	42	1½	65	82	17½	97	123	13½
2	2	11	34	43	7	66	84	3	98	124	19
3	3	16½	35	44	12½	67	85	8½	99	126	4½
4	5	2	36	45	18	68	86	14	100	127	10
5	6	7½	37	47	3½	69	87	19½	101	128	15½
6	7	13	38	48	9	70	89	5	102	130	1
7	8	18½	39	49	14½	71	90	10½	103	131	6½
8	10	4	40	51	0	72	91	16	104	132	12
9	11	9½	41	52	5½	73	93	1½	105	133	17½
10	12	15	42	53	11	74	94	7	106	135	3
11	14	0½	43	54	16½	75	95	12½	107	136	8½
12	15	6	44	56	2	76	96	18	108	137	14
13	16	11½	45	57	7½	77	98	3½	109	138	19½
14	17	17	46	58	13	78	99	9	110	140	5
15	19	2½	47	59	18½	79	100	14½	111	141	10½
16	20	8	48	61	4	80	102	0	112	142	16
17	21	13½	49	62	9½	81	103	5½	113	144	1½
18	22	19	50	63	15	82	104	11	114	145	7
19	24	4½	51	65	0½	83	105	16½	115	146	12½
20	25	10	52	66	6	84	107	2	116	147	18
21	26	15½	53	67	11½	85	108	7½	117	149	3½
22	28	1	54	68	17	86	109	13	118	150	9
23	29	6½	55	70	2½	87	110	18½	119	151	14½
24	30	12	56	71	8	88	112	4	120	153	0
25	31	17½	57	72	13½	89	113	9½	125	159	7½
26	33	3	58	73	19	90	114	15	130	165	15
27	34	8½	59	75	4½	91	116	0½	135	172	2½
28	35	14	60	76	10	92	117	6	140	178	10
29	36	19½	61	77	15½	93	118	11½	145	184	17½
30	38	5	62	79	1	94	119	17	150	191	5
31	39	10½	63	80	6½	95	121	2½			
32	40	16	64	81	12	96	122	8			

RELATIVE PRICES OF COALS.

⅌ Ton 20 cwt.		⅌ Imp. Chal. 25½ cwt.		⅌ New. Chal. 53 cwt.		⅌ Ton 20 cwt.		⅌ Imp. Chal. 25½ cwt.		⅌ New. Chal. 53 cwt.	
s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
1	0	1	3·30	2	7·80	10	9	13	8·47	28	5·85
1	3	1	7·12	3	3·75	11	0	14	0·30	29	1·80
1	6	1	10·95	3	11·70	11	3	14	4·12	29	9·75
1	9	2	2·77	4	7·65	11	6	14	7·95	30	5·70
2	0	2	6·60	5	3·60	11	9	14	11·77	31	1·65
2	3	2	10·42	5	11·55	12	0	15	3·60	31	9·60
2	6	3	2·25	6	7·50	12	3	15	7·42	32	5·55
2	9	3	6·07	7	3·45	12	6	15	11·25	33	1·50
3	0	3	9·90	7	11·40	12	9	16	3·07	33	9·45
3	3	4	1·72	8	7·35	13	0	16	6·90	34	5·40
3	6	4	5·55	9	3·30	13	3	16	10·72	35	1·35
3	9	4	9·37	9	11·25	13	6	17	2·55	35	9·30
4	0	5	1·20	10	7·20	13	9	17	6·37	36	5·25
4	3	5	5·02	11	3·15	14	0	17	10·20	37	1·20
4	6	5	8·85	11	11·10	14	3	18	2·02	37	9·15
4	9	6	0·67	12	7·05	14	6	18	5·85	38	5·10
5	0	6	4·50	13	3·00	14	9	18	9·67	39	1·05
5	3	6	8·32	13	10·95	15	0	19	1·50	39	9·00
5	6	7	0·15	14	6·90	15	3	19	5·32	40	4·95
5	9	7	3·97	15	2·85	15	6	19	9·15	41	0·90
6	0	7	7·80	15	10·80	15	9	20	0·97	41	8·85
6	3	7	11·62	16	6·75	16	0	20	4·80	42	4·80
6	6	8	3·45	17	2·70	16	3	20	8·62	43	0·75
6	9	8	7·27	17	10·65	16	6	21	0·45	43	8·70
7	0	8	11·10	18	6·60	16	9	21	4·27	44	4·65
7	3	9	2·92	19	2·55	17	0	21	8·10	45	0·60
7	6	9	6·75	19	10·50	17	3	21	11·92	45	8·55
7	9	9	10·57	20	6·45	17	6	22	3·75	46	4·50
8	0	10	2·40	21	2·40	17	9	22	7·57	47	0·45
8	3	10	6·22	21	10·35	18	0	22	11·40	47	8.40
8	6	10	10·05	22	6·30	18	3	23	3·22	48	4·35
8	9	11	1·87	23	2·25	18	6	23	7·05	49	0·30
9	0	11	5·70	23	10·20	18	9	23	10·87	49	8·25
9	3	11	9·52	24	6·15	19	0	24	2·70	50	4·20
9	6	12	1·35	25	2·10	19	3	24	6·52	51	0·15
9	9	12	5·17	25	10·05	19	6	24	10·35	51	8·10
10	0	12	9·00	26	6·00	19	9	25	2·17	52	4·05
10	3	13	0·82	27	1·95	20	0	25	6·00	53	0·00
10	6	13	4·65	27	9·90						

STANDARD, PRODUCE, AND PRICE OF COPPER ORES.

The Standard not being generally understood, or the rule whereby the price of ore, of a given produce sold at a certain standard, can be ascertained, as well as the standard at which ore sells, the produce and price of which are given, we are induced to give the following form, which is in itself so simple as to require no explanatory remarks :—

To ascertain the price per ton of Copper Ore the produce of which by assay is 8¾, at the standard of £94. 8*s.* multiply the given standard by the produce ; thus, £94. 8*s.* × 8¾ = £836, and which divided by 100, gives £8. 7*s.* 2*d.* as the rate or price per ton, from which deduct returning charges, £2. 15*s.*, leaving £5. 12*s.* 2*d.* as the actual price realized.

To determine the standard at which Ore sells, the price being £5. 17*s.* 6*d.* per ton, and the produce 9¼, add to the price, £5. 17*s.* 6*d.*, the returning charges of £2. 15*s.*, which give a total of £8. 12*s.* 6*d.* Then, as 9¼ : £8. 12*s.* 6*d.* : : 100 to the required standard, or £93. 4*s.* 10$\frac{14}{37}$*d.*

ALLOYS and COMPOSITIONS

Chinese White Copper.—40·4 parts copper, 31·6 nickel, 25·4 zinc, and 2·6 iron.

German Silver.—1 part nickel, 1 zinc, and 2 copper; when intended for rolling into plates, 25 nickel, 20 zinc, and 60 copper, to which may be added 3 of lead.

Manheim Gold.—3 parts copper, 1 zinc, and a small quantity of tin.

Alloy of the Standard Measures used by Government.—576 parts copper, 59 tin, and 48 brass.

Bath Metal.—32 parts brass, 9 parts zinc.

Speculum Metal.—6 parts copper, 2 parts tin, and 1 of arsenic; or, 7 of copper, 3 of zinc, and 4 of tin.

Hard Solder.—2 parts copper and 1 part zinc.

Blanched Copper.—8 parts of copper and $\frac{1}{2}$ part arsenic.

Britannia Metal.—4 parts of brass and 4 of tin; when fused, add 4 of bismuth and 4 of antimony. This composition is added at discretion to melted tin.

Plumber's Solder.—Equal parts of lead and tin.

Tinman's Solder.—2 parts of lead and 1 of tin.

Pewterer's Solder.—2 parts of tin and 1 of lead.

Common Pewter.—4 parts of tin and 1 of lead.

Best Pewter.—100 parts of tin and 17 of antimony.

A Metal that expands in cooling.—9 parts of lead, 2 of antimony, and 1 of bismuth. This metal is very useful in filling small defects in iron castings, &c.

Queen's Metal.—9 parts of tin, 1 of antimony, 1 of bismuth, and 1 of lead.

Mock Platinum.—8 parts of brass and 5 of zinc.

Silver Coin of Britain.—$11\frac{1}{10}$ pure silver and $9\frac{9}{10}$ copper.

Gold Coin of Britain.—11 parts pure gold and 1 copper. Previous to 1826, silver formed part of the alloy of gold coin; hence the different colour of our gold money.

Ring Gold.—6 dwts. 12 grains pure copper, 3 dwts. 16 grains fine silver, and 1 oz. 5 dwts. pure gold.

Mock Gold.—Fuse together 16 parts of copper, 7 of platinum, and 1 of zinc. When steel is alloyed with $\frac{1}{500}$ part of platinum, or with $\frac{1}{500}$ part of silver, it is rendered much harder, more malleable, and better adapted for every kind of cutting instrument.

NOTE.—In making alloys, care must be taken to have the more infusible metals melted first, and afterwards add the others.

Composition used in welding Cast Steel.—Take of borax 10 parts, sal-ammoniac 1 part; grind or pound them roughly together; then fuse them in a metal pot over a clear fire, taking care to continue the heat until all spume has disappeared from the surface. When the liquid appears clear, the composition is ready to be poured out to cool and concrete; afterwards, being ground to a fine powder, it is ready for use.

To use this composition, the steel to be welded is raised to a heat which may be expressed by "bright yellow," it is then dipped among the welding powder and again placed in the fire until it attains the same degree of heat as before; it is then ready to be placed under the hammer.

Cast-Iron Cement.—Take of clean borings or turnings of cast iron 16 parts, of sal-ammoniac 2 parts, and flour of sulphur 1 part; mix them well together in a mortar and keep them dry. When required for use, take 1 part of the mixture and 20 parts of clean borings, mix thoroughly, and add a sufficient quantity of water.

NOTE.—A little grindstone-dust added improves the cement.

Booth's Patent Grease for Railway Axles.—Water 1 gallon, clean tallow 3 lbs., palm-oil 6 lbs., common soda $\frac{1}{2}$ lb.; or tallow 8 lbs., and palm-oil 10 lbs. The mixture to be heated to about 210° F., and well stirred till it cools down to about 70°, when it is ready for use.

Cement for Steam-pipe Joints, &c. with faced flanges.—To 2 parts of white lead mixed add 1 part red lead dry, grind or otherwise mix them to a consistence of thin putty, apply interposed layers with one or two thicknesses of canvass or gauze wire, as the necessity of the case may be.—(*Weale's Engineer's Pocket-Book.*)

TABLE of ALLOYS, SOLDERS, and AMALGAMS, EMPLOYED in the ARTS.

BY M. CHAUDET, ASSAYER OF THE MINT, PARIS.

ALLOYS.

Gold coin—French standard	Gold 900, copper 100.
Silver coin ditto	Silver 900, copper 100.
Billon ditto	Copper 800, silver 200.
Gold medals ditto	Gold, 916, copper 84.
Bronze medals, cast (these wear a long time)	Copper 92, tin 8.
Jewellery—French standard	Gold 750, copper 250.
Silver plate ditto	Silver 950, copper 50.
Gold coin—United States standard	Gold 899·22, copper and silver 100·78.
Silver coin ditto	Silver 892·43, copper 107·57.
Gold coin—English standard	Gold 916·67, silver and copper 83·33.
Silver coin ditto	Silver 925, copper 75.
Imitation gold	Copper 91, tin 9·50.
Imitation silver (Chinese Packford)	Copper 61·27, zinc 28·78, nickel 15·13, lead 0·82.
For cannon	Copper 100, tin 11.
Statues (Keller's)	Copper 91·40, zinc 5·53, tin 1·70, lead 1·37
Bronzes and candelabras	Copper 82·00, zinc 18·00, tin 3·00, lead 1·50.
Mounting of firearms	Copper 80, zinc 17, tin 3.
Cymbals, Chinese gongs, &c.	Copper 80, tin 20.

This alloy is very hard, it is annealed by dipping, while red-hot, into water, and is then malleable; whilst, if suffered to cool gradually, it is excessively hard.

Bells	Copper 75, tin 25.
Reflectors of telescopes	Copper 2, tin 1.
Brass for lathes	Copper 65·80, zinc 31·80, lead 2·15.
Brass for the hammer	Copper 70·10, zinc 29·90.

This is a most important alloy, first made by M. Chaudet.

Types	Lead 80, antimony 20.
Alloy fusible in boiling water	Bismuth 8, lead 5, tin 3.
Plugging teeth	Bismuth 8, lead 5, tin 3, mercury 16.
For tinning iron	Tin 8, iron 1.
To make ductile gold of 18 carats, 90·0 fine	Gold 990, copper 10.
Bells of mantel clocks	Copper 75, tin 25.
Pivots of artificial teeth	Platinum —, silver —, (*P.N.Johnson*).
Ditto* ditto	Palladium 50, silver 50.
Springs of† ditto	Palladium 50, silver 50, copper 50, tin 10 (*P. N. Johnson*).

SOLDERS.

For gold of 750, or 18 carats	Gold of 750 2·00, copper 0·50, silver 0·50
Silver of 750	Silver 2, brass 1.
Brass	Copper 50, zinc 50.
Lead	Lead 2, tin 1.

AMALGAMS.

Gold for gilding on metal	Mercury 91 to 89, gold 9 to 11.
Silver for ditto	Mercury 85, silver 15.
For taking impressions of seals	Copper —, mercury —.

This amalgam is hard, and melts at a low heat; it was used by Fouché for the purpose of opening and resealing letters. The proportions are, of course, not given.

Silvering mirrors	Tin 70, mercury 30.
Silvering globes of glass	Mercury 80, bismuth 20.
For cushions of electrical machines	Mercury 2, tin 1, zinc 1.

* A very important and useful alloy, employed in the manufacture of philosophical instruments, as a substitute for platinum, to which it is superior in hardness and colour, and yet not oxydizable under ordinary circumstances.

† Another very useful alloy, possessing a degree of elasticity inferior only to steel, combined with the advantages of superior hardness and lightness over platinum.

RECIPES.

COLOURS.

Ultramarine.—The mode of preparing this beautiful pigment is to make the stones called lapis lazuli red hot, and throw them into water, when they may be easily pulverized. It is then reduced to a fine powder in a mortar, and intimately combined with a varnish composed of resin, wax, and linseed-oil. It is then of the consistence of paste, and is put into a linen cloth, and repeatedly kneaded, with hot water. The first water is thrown away, the second gives a blue tint of the first quality, and the third yields one of less value. This process is founded on the property of the earthy matter of the stones adhering more firmly to the stone than the colouring matter; the latter is therefore separated by washing away.

Egyptian Azure.—Sir Humphrey Davy discovered that this beautiful pigment, which has preserved its brilliancy of tint for more than 1,700 years, may be easily and cheaply made:—Fifteen parts of the carbonate of soda, with twenty of powdered opaque flints, and three of copper filings, when strongly heated together for two hours, will produce a substance, which, when powdered, will be of a fine deep sky-blue, and closely resembling the Egyptian azure in tint.

Artificial Ultramarine—Azure Blue—Vienna or Meissuer Ultramarine.—Mix together 1 part of porcelain clay, $1\frac{1}{2}$ part of sulphur, 1 part of anhydrous carbonate of soda, and keep the mixture at a dull red heat, in a covered crucible, as long as vapours are given off. On opening the crucible, it will be found to contain a spongy mass, part of which will be of a dark blue colour, and this is to be separated from the other part. The results of this process are not uniform, yet this is considered the best process that has yet been published.

Ultramarine Ashes—Sander's Blue.—The residue left after the extraction of ultramarine, according to the preceding process; the resinous cement being burned away, and the ashes washed.

Stone Blue—Fig Blue—Thumc Blue—Crown Blue—Mecklenburgh Blue—Queen's Blue.—Mix finely-powdered indigo with starch paste, and make it into cakes of the required size and form.

Mountain Blue—Hambro' Blue—Copper Blue.—This is a mixture of carbonate of copper and chalk or lime, which is exposed to the air until it assumes the required colour.

Blue Verditer—Refiners' Verditer.—No. 1. The solution of nitrate of copper, obtained by the refiners in precipitating silver from nitric acid by heating it with copper, is poured, while hot, upon whiting moistened with water, and the mixture stirred until the whole of the copper is precipitated, when more of the nitric solution is added, until the desired colour is produced. No. 2. The solution of nitrate of copper, as above, is precipitated with lime, which is added in the state of slaked lime. This precipitate, when nearly dry, is triturated with more lime, to develop the velvety blue colour, characteristic of verditer of the best quality. Process frequently unsuccessful in unskilful hands.

Prussian Blue—Berlin Blue.—This pigment is made by calcining animal matter, such as dried blood, parings of horns, &c. with about one-eighth of its weight of carbonate of potash, in an iron retort, exposed to a dull red heat for seven or eight hours; lixivating the product of this operation, and

adding common green vitriol, or sulphate of iron, to the lixivium. The precipitate is sometimes treated with nitric acid, which increases the depth and brilliancy of the colour. This, in its pure state, is said to constitute Paris blue. Mixed with other substances, such as alumina, gypsum, sulphate of barytes, clay, or starch, it forms the inferior kinds of Prussian and Berlin blue, also Saxon blue, Erlangen blue, Mineral blue, &c.

Saxon Blue.—Dissolve 1 oz. of sulphate of iron and 8 oz. of alum in 1 gal. of water; then add simultaneously solutions of prussiate of potash and of common pearlash, as long as any precipitate is formed. Collect and wash the precipitate.

Vienna Green—Sweinfurth Green.—Dissolve 1 lb. of arsenious acid in water; mix 1 lb. of powdered verdigris with warm water, and add the former solution to it; let the mixture stand until the re-action is complete. Sometimes the ingredients are boiled together, when the process is expedited. The addition of more arsenic gives the production a yellowish tint. It may also be made by dissolving 1 lb. of arsenious acid in water, and 1 lb. of verdigris in vinegar, mixing the two solutions, and evaporating the liquor until it crystallizes.

Brunswick Green—Mountain Green.—The pigments sold under these names vary very much in colour and in composition. They consist of native carbonates of copper, mixed with calcarious or other heavy powders; or of artificial compounds, containing arseniate or other salt of copper; gypsum and sulphate of barytes are frequently used in these mixtures. Some of the common greens, sold under the above and other names, are merely mixtures of Prussian blue, or indigo and chrome yellow, with chalk and sulphate of barytes.

Red Colours—Carmine—A Pigment made from Cochineal—as follows: No. 1. Boil 1 lb. of cochineal and 1 oz. of bitartrate of potash in 4 galls. of pure distilled water, for fifteen minutes; strain the decoction through flannel, add 1 oz. of alum and ½ oz. of carbonate of potash, and again boil for five minutes; remove the liquid from the fire, and let it stand in a glass or earthen vessel for two or three days, that the carmine may subside.—No. 2. Boil 1 lb. 4 oz. of cochineal, and 115 grains of carbonate of soda, in 4 galls. of soft water, for 20 minutes; then remove the boiler from the fire, and add 6 drams of alum, and 1 dram of bitartrate of potash; stir the mixture for a few minutes—let it stand for a quarter of an hour, for the dregs to subside, then carefully decant off the clear liquor—strain it through a fine silk sieve, and add the whites of two eggs, well beaten up. Sometimes the carmine will immediately separate, but at other times it is necessary to put the liquor again over the fire, and heat it, but not to the boiling point.—No. 3. Boil 1 lb. of cochineal and 2½ drams of carbonate of potash in 5 pails of water for a quarter of an hour; remove the decoction from the fire, and stir in 1 oz. of alum—allow the solution to stand for a quarter of an hour, that the dregs may subside, then decant the clear liquor, and put it again over the fire, at the same time add 3½ drams of isinglass, dissolved in 1 gall. of water, and strained. At the moment of ebullition, the carmine will rise to the surface; the pan is now to be removed from the fire, and left at rest, that the carmine may subside. It should be dried in a stove, at a temperature from 82° to 86° Fahr. A wood or charcoal fire should be used in the process, as the effluvia from coal fires is said to be very injurious to the product.

Carmine Lake.—No. 1. To the coloured liquor remaining after the preparation of carmine, some recently precipitated and still moist alumina is added, and the mixture stirred and heated a little, until the colouring matter is carried down with the alumina.—No. 2. Add a solution of alum to the coloured liquor remaining after the preparation of carmine, and then a solution

of carbonate of potash as long as any precipitate is formed. Solution of tin is sometimes added to brighten the colour.

Lac Lake.—Boil fresh stick-lac in a solution of carbonate of soda, and then add a solution of alum as long as any precipitate is formed.

Brown Red—Indian Red—Colcothar.—Under these names are sold the peroxide of iron, obtained by calcining the salts of iron. The colour varies according to the circumstances under which the calcination is conducted. The true Indian Red (Terra persica) is a mineral brought from Ormuz.

Ruddle—Reddle—Red Chalk—Red Lumber Stone.—These names are applied to clay iron-ore, consisting of clay and oxide of iron, a mineral of a deep red colour, intermediate between Bole and Red Ochre, containing more oxide of iron than the former, and less than the latter. It is used for marking on wood, paper, &c., and is made into crayons. It is also sometimes used in paints.

Venetian Red—Bolus Veneta.—A kind of Red Ochre, brought from Venice. It is also harder and darker coloured by heating.

White Colours—Alum White (Baum's Alum White).—Mix $\frac{1}{2}$ lb. of honey with 1 lb. of alum; calcine the mixture in a shallow vessel, and heat it to whiteness—wash dry, and powder the residue, which will be beautifully white, and suitable for use with oil.

White Lead (Basic Carbonate of Lead).—Made by exposing sheet-lead to the vapour of acetic acid in close chambers. Different varieties of this pigment have been distinguished, according to the process by which they have been made. Thus, common vinegar, alegar, molasses vinegar, the refuse water of starch-makers, &c. have been used in the process, and the products distinguished as Flake White, Nottingham White, Grace's White Lead, &c.

Venice White.—Carbonate of lead, sulphate of baryta, *p. æ.*

Hamburgh White.—Carbonate of lead, 1 part; sulphate of baryta, 2 parts.

Krem's White.—Pure carbonate of lead.

Naples Yellow.—3 parts of white oxide of antimony, 12 of white oxide of lead, 1 of sulphate of alumina, and 1 of muriate of ammonia, first heated weakly for some hours, and then kept in a red heat.

Cake Oil Colours.—The colours are first ground with a weak solution of mastic in oil of turpentine; they are then dried, put on a stone heated by a charcoal fire put under it, and ground with a mixture of 3 parts of spermaceti and 1 part of poppy-oil. The paste is afterwards pressed into a mould, and allowed to harden.

PYROTECHNICS.

Coloured Fires—Blue Fires.—5 parts nitre, 2 parts sulphur, 1 part metallic antimony. Mix.

Crimson Fire.—$4\frac{1}{4}$ parts chlorate of potash, $67\frac{1}{2}$ parts nitrate of strontia, $5\frac{3}{4}$ parts charcoal, $22\frac{1}{2}$ parts sulphur. Mix.

Green Fire.—$62\frac{1}{3}$ parts nitrate of baryta, $10\frac{1}{2}$ parts sulphur, $23\frac{3}{4}$ parts chlorate of potash, $1\frac{3}{4}$ part charcoal, $1\frac{3}{4}$ part sulphuret of arsenic. Mix.

Lilac Fire.—49 parts chlorate of potash, 25 parts sulphur, 20 parts dry chalk, 6 parts black oxide of copper. Mix.

Purple Fire.—42 parts chlorate of potash, 42 parts nitre, $22\frac{3}{4}$ parts sulphur, 10 parts black oxide of copper, $2\frac{3}{4}$ parts sulphuret of mercury. Mix.

White Fire.—$46\frac{1}{2}$ parts nitre, 23 parts sulphur, $12\frac{1}{4}$ parts gunpowder, 18 parts zinc powder. Mix.

Yellow Fire.—74¼ parts dried nitrate of soda, 19½ parts sulphur, 6 parts charcoal. Mix.

Some of these compositions are liable to undergo spontaneous combustion when kept for some time, even when enclosed in bottles. Serious accidents have arisen from this cause.

Red Fires.—72 parts dried nitrate of strontia, 20 parts sulphur, 6 parts gunpowder, 2 parts coal-dust.

Congreve or Lucifer Matches.—No. 1. Gum arabic, 16 parts; phosphorus, powdered, 9 parts; nitrate of potash, 14 parts; black oxide of manganese, 18 parts; made into a paste with water, and the matches dipped into it. No. 2. Phosphorus, 4 parts; nitrate of potash, 10 parts; glue, 6 parts; red lead, 5 parts; smalt, 2 parts. The glue is first soaked in cold water, then put into a heated mortar, so as to liquefy it; the phosphorus is then added, then the nitre, red lead, and smalt: and the whole mixed into an homogeneous mass, the temperature being never allowed to exceed 167° Fahr. The matches are dipped into this paste, and then dried. These matches ignite on being rubbed over a rough surface. The phosphorus may be reduced to a state of minute division suitable for use in these preparations, by putting it into a flask or bottle with some spirit; immersing the bottle in hot water until the phosphorus is melted, then briskly agitating it until cold.

Matches for obtaining Instantaneous Light, by Chemical Action—Chlorate Matches.—No. 1. Chlorate of potash, 2 scruples; white sugar, 12 grains; sulphur, 8 grains; powdered tragacanth, 4 grains; vermilion, 6 grains. Reduce the ingredients separately to powder, mix them together, form them into a paste with water, dip the ends of the matches into the paste, and dry them.—No. 2. Chlorate of potash, 1 drachm; sulphur, 6 grains; white sugar, 6 grains; powdered gum arabic, 5 grains; golden sulphuret of antimony, 5 grains. Mix into a paste with water, and apply as No. 1. These matches ignite on being dipped into a bottle containing asbestos, wetted with a strong oil of vitriol.

CEMENTS.

Various Cements.—No. 1. Shellac dissolved in rectified spirit forms a good cement in some cases; or the shellac may be melted in the flame of a candle, and applied in this state. Shellac dissolved in water, with one-third of its weight of borax, is sometimes used.—No. 2. The white of egg mixed with fine prepared quicklime, forms a good cement for joining spars and marble ornaments. A similar composition is used by coppersmiths to secure the joints and rivets of boilers, but they substitute bullocks' blood for the white of egg.—No. 3. Clean river sand, 20 lbs.; litharge, 2 lbs.; quicklime 1 lb.; linseed-oil sufficient to form a thin paste. This cement is applied to mend broken pieces of stone, as steps, &c.; and after a time it becomes exceedingly hard and strong. A similar composition has been used to coat brick walls, under the name of mastic.—No. 4. Iron-borings, 50 lbs., pounded and sifted; mix with 1 lb. of chloride of ammonium, or sal-ammoniac. When it is to be used, it should be mixed with as much water as will give it a pasty consistence. This is an excellent cement for stopping cracks in iron boilers, tanks, &c.—No. 5. Iron-borings, 4 lbs.; potters' clay, 2 lbs.; powdered potsherds, 1 lb. Make into a paste with salt and water. This becomes very hard on drying.—No. 6. Chalk, 1 lb.; glue, 2 lbs.; paper, 1 lb. boiled in water, and beaten to a pulp. Mix. Used for making architectural ornaments in relief.—No. 7. Whiting, 16 lbs. sifted and heated to redness; black resin, 16 lbs.; bees' wax, 1 lb. The last two are to be

melted together, and the whiting to be stirred in during the cooling.—No. 8. Boiled linseed-oil and red lead, mixed so as to form a thin paste. Used by engineers.

Engineers' Cement.—No. 1. Mix ground white lead with as much finely-powdered red lead as will make it the consistence of soft putty.—No. 2. Mix equal parts with white lead and red lead, and add as much boiled linseed-oil as is required to give it the proper consistence. These cements are used for making metallic joints sound.

French Cement.—Gum water thickened with powdered starch. It is used by the French naturalists and artificial flower-makers. It keeps for a long time. A little lemon-juice is sometimes added.

Marine Cement—Marine Glue.—Digest from 2 to 4 parts of caoutchouc, cut into small pieces, in 34 parts of coal-tar naphtha, promoting solution by the application of heat and by agitation. The solution, when formed, will have the consistency of thick cream; to this add 62 or 64 parts of powdered shellac, and heat the mixture over the fire, constantly stirring it until complete fusion and combination has been effected. Pour the mixture, while still hot, on plates of metal, so that it may cool in thin sheets like leather. In using this cement, put some of it in an iron vessel, and heat it about 248° Fahr., and apply it with a brush to the surfaces to be joined. It is said to make a perfect union of pieces of wood, and is recommended for use in shipbuilding—hence its name.

Keene's Marble Cement.—Gypsum is baked in the same way as for making plaster of Paris; it is then soaked in a saturated solution of alum—again baked to the same degree as before, and ground to a fine powder. It is now in a fit state for use. On being worked in the same way as plaster of Paris, it sets into a very hard composition, which is capable of taking a high polish. It may be coloured by mixing the powder with water containing any mineral colours, instead of common water.

For Mending Steam-Boilers, &c.—Mix two parts of finely-powdered litharge with one part of very fine sand, and one part of quicklime, which has been allowed to slack spontaneously by exposure to the air. This mixture may be kept for any length of time without injury. In using it, a portion is mixed into a paste with linseed-oil, or, still better, boiled linseed-oil. In this state it must be quickly applied, as it soon becomes hard.

Hamelin's Mastic Cement.—Mix 50 parts of silicious sand, 50 parts of lime marl, or pulverized Portland or Bath stone, and 8 parts of litharge. When the cement is used, it is to be ground up with linseed-oil.

LACQUERS AND VARNISHES.

Lacquers.—No. 1.—Shellac, 120 parts; sandrach, 45 parts; mastic, 30 parts; black resin, 90 parts; dragons' blood, 30 parts; turmeric and gamboges, each 24 parts; rectified spirit 1,000 parts. Digest until dissolved, then strain.—No. 2. Seedlac, 120 parts; sandrach, 120 parts, dragons' blood, 16 parts; gamboge, 2 parts; turmeric, 2 parts; Venice turpentine, 50 parts; clean sand, 150 parts; rectified spirit, 1,000 parts. Digest in a sand bath, and strain.—No. 3. Seedlac, gamboge, and dragons' blood, each 120 parts; saffron, 30 parts; rectified spirits, 1,000 parts. Digest with heat and strain. No. 4. Seedlac and sandrach, each 120 parts; dragons' blood, 15 parts; turmeric, 2 parts; gamboge, 2 parts; Venice turpentine, 60 parts; spirit of turpentine, 1,000 parts. Digest with heat and strain. Aloes are sometimes used to give it a darker colour.

Copal Varnish.—No. 1. Copal, 10 parts, in coarse powder; clean sand, 10 parts; camphor, 1 part; rectified spirit, 100 parts. Mix the copal and sand, and enclose them in a linen bag. Dissolve the camphor in the spirit, and put them into a cohobation apparatus, suspending the bag of resin near the top of the liquid. Boil the spirit until the resin is dissolved.—No. 2. Copal, 90 parts; sandrach, 180 parts; mastic, 90 parts; Venice turpentine, 75 parts; clean sand, 100 parts; rectified spirits, 1,000 parts. Dissolve as No. 1. Anime is generally substituted for copal in making these varnishes.

Picture Varnish.—No. 1. Mastic Varnish. Mastic, 300 parts; Venice turpentine, 45 parts; camphor, 15 parts; spirit of turpentine, 1,000 parts. Dissolve with heat.—No. 2. Copal, or anime, 60 parts; camphor, 4 parts; oil of spike lavender, 180 parts. Dissolve with heat, then add spirit of turpentine, sufficient to give it the proper consistence.

Lac Varnish.—Shellac, 90 parts; Venice turpentine, 4 parts; rectified spirit, 500 parts. Digest until dissolved, then strain.

SEALING-WAX.

Sealing-Wax.—The basis of the best sealing-wax is shellac and dammar, or anime resins, but inferior sorts are made with common resin. The light-coloured resins, which will burn well, and flow in a semi-fluid state, are selected for receiving the light and delicate colours which are imparted by the admixture of certain pigments.—No. 1. *Red Sealing-Wax*—Shellac, 2 lbs.; Venice turpentine, 1 lb.; vermilion, or best bichromate of lead, 1½ lb. Melt the shellac and turpentine together with heat, and add the pigment as the mixture cools.—No. 2. Shellac, 2 lbs.; dammar or anime resin, 4 lbs.; Venice turpentine, 1 lb.; vermilion, or best bichromate of lead, 2 lbs. Mix as No. 1.—No. 3. Shellac, 2 lbs.; common yellow resin, 4 lbs.; Venice turpentine, 1½ lb.; bichromate of lead, 2 lbs. Mix.

Black Sealing-Wax is made in the same way as the red, only substituting lamp-black for vermilion. In like manner other colours are imparted, by varying the pigment, and using chromate of lead, verdigris, green verdita, &c.

Gold Sealing-Wax is made by using gold-coloured talc, or bisulphuret of tin.

Marbled Sealing-Wax.—Melt in separate vessels a portion of wax of each colour intended to be mixed, and when they are partly cooled, mix them together, slightly stirring the mixture with a rod.

Soft Sealing-Wax.—Bees' wax, 4 lbs.; Venice turpentine, 1 lb.; levigated bole, sufficient to give the required colour.

Bottle Wax.—Black resin, 6 lbs.; bees' wax, ½ lb.; ivory, or lamp-black, 1½ lb. Mix with heat. Venetian red, red lead, or bole, may be substituted for lamp-black.

BLACKING.

English Patent Process for the Manufacture of Blacking—Paste Blacking.—Ivory black, 60 lbs.; treacle, 45 lbs.; vinegar, 12 lbs.; oil of vitriol, 12 lbs. Mix for 30 minutes, and add 9 lbs. of India-rubber oil.

Liquid Blacking.—Ivory-black, 60 lbs.; gum arabic, 1 lb.; dissolved in vinegar, No. 24 (20 gallons). Mix well, and add gradually oil of vitriol, 24 lbs. Stir half an hour daily for a month. After 10 days add—gum arabic, 3 lbs.; India-rubber oil; India rubber, in small pieces, 18 oz.; rape-oil, 9 lbs. Dissolve in a water bath.

French Patent Blacking.—Treacle, 2,000 parts; add gelatine or glue, 60 parts. Mix this with animal charcoal, 5,000; add oleic acid, or other oil, 90 parts; any salt of copper, 15 parts; ox gall, 5 parts; lastly, oil of vitriol, 1,000 parts; muriatic acid, 1,000 parts. Mix the whole well together.

Common Blacking. — No. 1. Ivory-black and treacle, each 12 oz.; sperm-oil, and oil of vitriol, of each 3 oz.; vinegar, 4 pints. Mix the ivory-black, treacle, and vinegar together; then mix the sperm-oil and oil of vitriol, separately, and add them to the other mixture.—No. 2. Ivory-black, 12 oz.; treacle, 4 oz.; sperm-oil, 1 oz.; oil of vitriol, 2 oz.; vinegar, 2 pints; sugar-candy, 1 oz. Mix as No. 1.—No. 3. Lamp-black and brown sugar, of each 16 oz.; sperm-oil, 3 oz.; gum arabic, ½ oz.; oil of vitriol, 3 oz.; vinegar, 4 pints; water, 2 pints. Dissolve the sugar and gum in the water, add to this the lamp-black and oil; and then the vinegar and oil, previously mixed together.—[It is a point of much importance in the manufacture of blacking, that the ivory-black be genuine; the ivory-black ordinarily sold usually containing a large proportion of powdered wood charcoal. The surest method is to purchase the animal charcoal in a granular state, such as is used by the sugar-refiner and the chemist for decolorizing purposes, and reduce it to powder.]

MISCELLANEOUS.

To give the Appearance of Marble to Plaster Figures.—To 1 oz. of Windsor soap (grated), dissolved in a glazed earthenware vessel in 4 fluid pounds of water, add 1 oz. of bees' wax, cut into thin slices, and when incorporated it will be fit for use. Dry the figure well before a fire, dip into the varnish (which it will at first appear to absorb), and in about two minutes stir the compost and dip it again. Put it out of dust for a week, then rub it gently with a soft linen rag or cotton wool, and a fine gloss will be produced. Great care, however, is necessary to be taken in this part of the process.

Tanned Gelatine, or Artificial Horn.—A manufactory has been established in Paris for the construction of a variety of ornamental articles with this substance. The gelatine is usually obtained from bones by treating them with a weak solution of muriatic acid, and it is afterwards tanned by the common process, as in making leather. Upon becoming hard and dry, it assumes the appearance of horn or tortoise-shell, and is employed for the same purposes as those natural productions. It is softened by being boiled in water with potash, when it may be formed into any shape, and the figure preserved by drying the articles between moulds. In the soft state it may also be inlaid with gold, silver, or other metals, and it may be streaked with various coloured materials, so as to resemble the finest and most beautiful woods. It is probable that this substance will soon be brought very extensively into use, on account of its elegance and cheapness.

Artificial Mahogany.—The following method of giving any species of wood of a close grain the appearance of mahogany in texture, density, and polish, is said to be practised in France with such success, that the best judges are incapable of distinguishing between the imitation and mahogany. The surface is first planed smooth, and the wood is then rubbed with a solution of nitrous acid; 1 oz. of dragons' blood is dissolved in nearly a pint of spirits of wine; this and one-third of an ounce of carbonate of soda are then to be mixed together and filtered, and the liquid in this thin state is to be laid on with a soft brush. This process is to be repeated, and in a short interval afterwards the wood possesses the external appearance of mahogany. When the polish diminishes in brilliancy, it may be restored by the use of a little cold-drawn linseed-oil.

PART II.

Scientific Bodies.

SOCIETIES FOR THE PROMOTION OF ENGINEERING, MINING, AND ALLIED SCIENCES.

Birmingham Institution of Mechanical Engineers
Polytechnic Institution
Dublin .... Royal Dublin Society
Institution of Civil Engineers
Dudley .... Dudley and Midland Geological Society
Edinburgh Scottish Society of Arts
Wernerian Society
Leeds ...... Geological and Polytechnic Institution of the West Riding
Liverpool .. Polytechnic Institution
London .... Institution of Civil Engineers
Linnean Society
London .... Geological Society
Society of Arts
Chemical Society
United Service Institution
Manchester Philosophical Society
Newcastle .. Literary and Philosophical Society
Paris ...... Institution of Civil Engineers
Philadelphia Franklin Institute
Penzance .. Royal Cornwall Geological Society
Falmouth .. Polytechnic Society
Worcester .. Natural History Society
York ...... Yorkshire Philosophical Society

British Association for the Advancement of Science.

MUSEUMS OF ENGINEERING, MINING, AND ALLIED SCIENCES.

Bristol .. Bristol Institution
Dublin .. Royal Dublin Society
Dudley .. Dudley and Midland Geological Society
Durham.. College Museum
London .. British Museum
Geological Society
Museum of Economic Geology
East-India Museum
London .. Institution of Civil Engineers
Royal Polytechnic Institution
United Service Museum
Mr. Saull's Museum of Geology, Aldersgate-street
Society of Arts
Worcester Museum
York .... Yorkshire Philosophical Society

LIBRARIES OF ENGINEERING, MINING, AND ALLIED SCIENCES.

Birmingham Polytechnic Institution
Dublin .... Trinity College
Royal Dublin Society
Edinburgh.. Advocates' Library
Glasgow.... University Library
London .... British Museum
Linnean Society
Museum of Econ. Geology
Records of Regis. of Designs
London .... Geological Society
Records of Registrar of Joint Stock Companies
United Service Institution
Institution of Civil Enginrs
Putney College
London Mechanics' Institution
Truro ...... Royal Cornwall Institution

SCHOOLS OF ENGINEERING, MINING, AND ALLIED SCIENCES.

Addiscombe .. Royal East-India College
Belfast ...... Queen's College
Birmingham.. Queen's College
Bombay...... Elphinstone College
Chatham .... Military Academy (Engineering)
Cirencester .. Royal Agricultural College (Geology, Chemistry, and Surveying)
Cork .... Queen's College
Dublin ...... Trinity College (Engineering, Geology, and Chemistry)
Royal Dublin Society (Geology and Chemistry)
Durham...... University College (Engineering, Geology, and Chemistry)
Glasgow...... University College (Engineering and Chemistry)
London ...... University College (Engineering, Geology, and Chemistry)
King's College (Engineering, Geology, and Chemistry)
Royal Institution (Chemistry)
Museum of Economic Geology (Mineralogy)
Royal Academy, Woolwich
Royal Polytechnic Institution (Chemistry and Steam Engines)
College for Chemistry (Chemistry)
Putney College (Engineering, Geology, and Chemistry)
Portsmouth .. Naval College
Sandhurst.... Royal Military College
St. Andrew's.. St. Salvador College (Engineering and Chemistry)

EXHIBITIONS OF ENGINEERING AND ALLIED SUBJECTS.

British Association (Mechanical Section)
Royal Agricultural Association (Machinery)
National Exhibition, 1851—Office, Old Scotland-yard
Society of Arts, John-street, Adelphi

CHEMICAL LABORATORIES.

Belfast .. Royal Academical Institution
Birmingm Queen's College
Bristol .. Medical School
Dublin .. Trinity College
Royal Dublin Society
Apothecaries' Hall
Durham.. University College
Edinburgh University
Glasgow.. University
Andersonian University
Liverpool Medical School
London .. University College, Birkbeck Laboratory
King's College
Museum of Economic Geology
Royal Polytechnic Institution
College for Chemistry
London .. Putney College
St. Bartholomew's College
St. Thomas's College
St. George's College
Hunterian School
Guy's,
London,
Middlesex,
Charing Cross, and
Westminster Hospitals
Royal Mil. Acad., Woolwich
Royal Institution
London Institution
Apothecaries' Hall
Manchestr Medical School
Newcastle Medical School

ASSAY OFFICES.

Birmingm Assay Office
Chester .. Goldsmiths' Hall
Dublin .. Goldsmiths' Hall
Apothecaries' Hall
Edinburgh Goldsmiths' Hall
Exeter .. Goldsmiths' Hall
London .. Goldsmiths' Hall
Royal Mint
Apothecaries' Hall
Royal Polytechnic Institution
Newcastle Goldsmiths' Hall

THE ROYAL SOCIETY.

HER SACRED MAJESTY QUEEN VICTORIA, PATRON.

Date of Election.

1840 Apr. 30—His Royal Highness Prince Albert of Saxe Coburg and Gotha
1828 Apr. 24—His Royal Highness Ernest Augustus, Duke of Cumberland, King of Hanover
1817 May 22—His Imperial Majesty Nicholas, Emperor of all the Russias
1842 Jan. 20—His Majesty Frederick William IV., King of Prussia
1816 — His Majesty Leopold, King of the Belgians
1822 June 6—His Majesty Christian VIII., King of Denmark, D.C.L.
1844 June 13—His Majesty Frederick, King of Saxony
1826 Dec. 21—His Majesty Oscar I., King of Sweden and Norway
1838 May 24—His Imperial and Royal Highness Leopold the Second, Grand Duke of Tuscany
1816 Feb. 8—His Imperial Highness the Archduke John of Austria
1816 Feb. 8—His Imperial Highness the Archduke Louis of Austria
1802 Mar. 4—His Imperial Highness the Archduke Maximilian of Austria

The Council.

The Earl of Rosse, *President.*

G. Rennie, Esq., *Treasurer*
S. H. Christie, Esq., M.A., *Secretary*
Thomas Bell, Esq., *Secretary*
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William Robert Grove, Esq., M.A.
Leonard Horner, Esq.
Gideon Algernon Mantell, Esq., LL.D.
William Allen Miller, M.D.
Rev. Henry Moseley, M.A.
Sir Roderick Impey Murchison, M.A.
Richard Owen, Esq.
Right Hon. Sir Frederick Pollock, M.A.
Lieut.-Col. William Reid, R.E.
Peter Mark Roget, M.D.
Charles Wheatstone, Esq.

Charles Richard Weld, *Assistant Secretary.*

Fellows of the Society.

Date of Election.

1808 Aberdeen, G., Earl of, K.T. Trust. Brit. Mus.—President of the Society of Antiquaries, F.L.S. Argyll-house
1847 Ackland, H. W. D., M.D. Oxford
1839 Acland, Sir T. Dyke, Bart., F.G.S. Killerton-park, Devon
1845 Adair, R. S. 7, Audley-square
1834 Adare, E., Viscount, F.R.A.S. Adare-abbey, Limerick; Dunraven-castle, Glamorganshire
1846 Addison, W., M.D., F.L.S. Great Malvern
1832 Agar, Hon. G. C., M.A. University Club
1836 Airy, G. B., M.A., D.C.L., Astronomer Royal, V.P.R.A.S.—Hon. Mem. R.S.E., R.I.A., R.I.S.W., F.C.P.S. The Royal Observatory, Greenwich
1841 Alderson, J., M.D., Coll. Reg. Med. Socius. 36, Charles-street, Berkeley-sq.
1847 Alexander, H. 6, Cork-street
1844 Allen, W., Capt., R.N. Athenæum Club
1824 Amyot, T., Treas. S.A., Hon. M.R.I.A. Soc. Reg. Antiq. Septen. Hafn. Socius. 13, James-street, Westminster
1821 Andrew, J., LL.D.
1834 Ansell, C., F.S.A. Tottenham
1844 Ansted, D. T., M.A., F.G.S., F.L.S., F.C.P.S., Professor of Geology, King's College, London. 36, Gloucester-road, Hyde-park-gardens

1840 Archibald, C. D., F.S.A., F.G.S., M.R.I. 3, York-terrace, Regent's-park
1846 Armstrong, W. G. Newcastle-upon-Tyne
1843 Arnott, J. M. 2, New Burlington-street
1838 Arnott, N., M.D. 38, Bedford-square
1830 Audubon, J. J., F.L.S.
1840 Auldjo, J. Noel-house, Kensington
1837 Ayrton, W., F.S.A. 39, Dorset-square
1816 Babbage, C., M.A., F.R.S.E., Hon. M.R.I.A., F.R.A.S., M.C.P.S. Inst. Reg. Sc. Paris., Corresp. Acadd. Reg. Sc. Masil., Hafn., et Divion. ex. intim., &c. 1, Dorset-street, Manchester-square
1816 Baber, Rev. H. H., M.A., M.R.S.L., &c. Streatham, Cambridgeshire
1828 Babington, B. G., M.D., Coll. Reg. Med. Socius. 31, George-street
1847 Back, Sir G., Knt., Capt., R.N. Gloucester-place, Portman-square
1836 Baillie, D. 14, Belgrave-square
1842 Baily, E. H., R.A. 10, Percy-street, Tottenham-court-road
1847 Baly, W., M.D., Coll. Reg. Med. Socius. 28, Spring-gardens
1845 Bandon, Right Hon. Earl. 6, Hyde Park-terrace
1834 Barlow, Rev. J., M.A., F.L.S., Sec. R.I. 5, Berkeley-street, Piccadilly
1823 Barlow, P., F.R.A.S., Hon. M.C.P.S., &c. Royal Mil. Academy, Woolwich
1845 Barlow, P. W. 8, Elliot-place, Blackheath
1809 Barnwell, C. F., M.A., F.S.A. 44, Woburn-place, Russell-square
1823 Baron, J., M.D. Cheltenham
1844 Barrow, J. 7, New-street, Spring-gardens
1840 Barry, M., M.D., F.R.S.E., Coll. Reg. Med. Edin. Socius. Edinburgh
1838 Bateman, J., F.L.S. Knypersley-hall, Staffordshire
1827 Beamish, Maj. N. L., K.H. Wyndham Club, St. James's-square
1836 Beamish, R.
1814 Beaufort, F., Capt. R.N., F.G.S., F.R.A.S., &c. Admiralty
1815 Beaufoy, H., F.L.S. South Lambeth
1835 Beaumont, E. B., F.R.A.S. 144, Piccadilly
1824 Beechey, F. W., Capt. R.N., F.R.A.S. 8, Westbourne-crescent
1835 Beetham, A. W., F.S.A. 3, Serjeants'-inn, Fleet-street
1828 Bell, T., F.L.S., F.G.S., Socc. Hist. Nat. et Philomath., Paris, &c. 17, New Broad-street
1834 Bellamy, Rev. J. W., B.D. Sellinge Vicarage, Ashford, Kent
1841 Bennett, J. J., Sec. L.S. British Museum
1831 Beverly, C. J., F.L.S. 1, Hackney-grove, Hackney
1822 Bexley, N., Lord, M.A., F.S.A., M.R.S.L. 31, Great George-street
1827 Bicheno, J. E., F.L.S., F.G.S., Col. Sec. Van Diemen's Land, Hobarton
1844 Billing, A., M.D., Col. Reg. Med. Socius, &c. 6, Grosvenor-gate, Park-lane
1846 Bird, G., A.M., M.D., Coll. Reg. Med. Socius. 19, Myddleton-square
1848 Bishop, G. South Villa, Regent's-park
1844 Bishop, J. 38, Bernard-street, Russell-square
1830 Blake, Capt. B., F.G.S., F.R.A.S. India
1843 Blake, H. W. Soho, Birmingham; and 62, Portland-place
1807 Blake, W., M.A., F.G.S. 62, Portland-place
1831 Blake, W. J. 62, Portland-place
1841 Blakiston, P., M.D., Coll. Reg. Med. Socius. Birmingham
1816 Bland, M., F.S.A., F.G.S. St. Leonard's, Hastings
1821 Bland, Rev. M., D.D., F.S.A., F.R.A.S., M.R.S.L. Lilley Rectory, Luton
1841 Blore, E. 4, Manchester-square
1837 Boase, H., M.D., F.G.S. Claverhouse, near Dundee
1840 Boileau, J. T., Major E.I.C.S. India
1843 Boileau, Sir J., Bart. 20, Upper Brook-street
1840 Bonner, Col. J. G., E.I.C.S. 11 A, Great Cumberland-street
1834 Booth, Sir F., Bart. 43, Portland-place; and Hendon, Middlesex
1846 Booth, Rev. J., LL.D., M.R.I.A. Everton, Liverpool
1835 Borrer, W., F.L.S. Henfield, Sussex
1829 Bosworth, Rev. J., LL.D., F.S.A., M.R.I.A. 9, Southampton-st., Bloomsb.
1839 Botfield, B., M.P., F.S.A., F.R.A.S., F.G.S., F.L.S. Norton-hall, Northamp.
1814 Boughton, Sir W. E. R., Bart. Downton-hall, Ludlow
1842 Bowerbank, J. S., F.G.S. 3, Highbury-grove
1841 Bowman, W. 14, Golden-square
1809 Brande, W. T., F.R.S.E. Royal Mint
1821 Brandreth, T. S. University Club
1834 Breadalbane, J. C., Marquis of, K.T. 21, Park-lane

1815 Brewster, Sir D., K.H., LL.D., F.R.S.E., Hon. M.R.I.A., F.G.S., F.R.A.S., &c. St. Andrew's
1838 Briggs, Maj.-Gen. J., E.I.C.S., M.R.A.S., F.G.S. 3, Charles-st., St. James's
1821 Bright, R., M.D., Coll. Reg. Med. Socius, F.G.S., &c. 11, Saville-row
1810 Brisbane, Lieut.-Gen. Sir T. M., Bart., K.C.B., G.C.H., D.C.L. Makerstown
1805 Bristol, F. W., Marquis of. 6, St. James's-square
1834 Brockedon, W. 29, Devonshire-street, Queen-square
1828 Broderip, W. J., B.A., F.L.S., F.G.S. 2, Raymond's-buildings, Gray's-inn
1810 Brodie, Sir B. C., Bart. 14, Saville-row
1817 Bromhead, Sir E. F., Bart., M.A., F.R.S.E., F.R.A.S. Thurlby, Lincolnshire
1823 Brooke, Sir A. B. de Capell, Bart., M.A., F.L.S., F.G.S. Okeley
1847 Brooke, C., B.A. 29, Keppel-street, Russell-square
1819 Brooke, H. J., F.L.S., F.G.S. Clapham-rise
1803 Brougham, H., Lord, M.A. 4, Grafton-street
1842 Broughton, R. E. 1, Melcombe-place
1811 Brown, R., D.C.L., Hon. Mem. R.S.E., R.I.A., &c. 17, Dean-street, Soho
1838 Brownlow, J., Earl, D.C.L., F.S.A., F.L.S., F.G.S., M.R.A.S. 12, Belgrave-square
1829 Bruce, Right Hon. Sir J. L. K., Knt., F.S.A. Rochampton Priory
1830 Brunel, I. K. 18, Duke-street, Westminster
1814 Brunel, Sir M. I., Knt.
1833 Buccleuch, W. F., Duke of, K.T., D.C.L., F.L.S. Whitehall-gardens
1818 Buckland, Very Rev. W., D.D., Dean of Westminster, F.L.S., V.P.G.S., &c. Deanery, Westminster
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1829 Burlington, W., Earl of, M.A. 10, Belgrave-square
1835 Burnes, J., K.H., D.C.L. India
1837 Burnet, J. 12, Sloane-street
1838 Burnet, Rev. T., D.D. 13, Finsbury-square
1833 Burnett, Sir W., K.C.H., M.D., &c. 5, Somerset-place
1814 Burney, Rev. C. P., D.D., F.S.A., F.L.S., F.G.S., F.R.A.S., M.R.A.S., M.R.S.L. Rectory-house, Sible Hedingham, Essex
1829 Burns, J., M.D. Glasgow
1818 Burrow, Rev. E. J., D.D., F.G.S. Gibraltar
1847 Burrows, G., M.D. 45, Queen Anne-street, Cavendish-square
1836 Burt, Major T. S., M.R.A.S. India
1832 Burton, D., F.S.A. 6, Spring-gardens
1836 Burton, E., F.L.S. Brooklyn, near Maidstone
1844 Bury, E. Hanslope-park, Newport Pagnell
1819 Butler, the Very Rev. G., D.D., Dean of Peterborough, F.S.A., F.R.A.S.
1822 Butter, J., M.D., F.L.S. Windsor-villas, Plymouth
1837 Cabbell, B. B., F.S.A. 1, Brick-court, Temple; and Portland-place
1810 Cadell, W. A., F.R.S.E., F.G.S. Edinburgh
1831 Caldcleugh, A., F.L.S., F.G.S. Chili
1840 Caldecott, J., F.R.A.S. Observatory, Travancore, India
1839 Carington, R. J., Lord. Whitehall-yard; and Wycombe-abbey, Bucks
1826 Carleton, Hon. and Rev. R., M.A. Greywell-hill, Odiham, Hampshire
1818 Carne, J., M.R.I.A., F.G.S. Penzance
1844 Carpenter, W. B., M.D. 6, Regent's-park-terrace
1800 Carrington, Sir C. E., Knt., D.C.L., F.S.A., M.R.A.S.
1841 Cartwright, S., F.L.S. 32, Old Burlington-street
1846 Cautley, P. T., Major, F.G.S. India
1812 Cawdor, J. F., Earl, Trust. Brit. Mus., F.G.S. 74, South Audley-street
1848 Challis, Rev. J. Cambridge
1828 Chambers, W. F., M.D., K.C.H., Physician to the Queen. 46, Brook-street
1833 Chandler, Very Rev. G., Dean of Chichester, D.C.L., M.R.S.L., R.G.S. 36, Mortimer-street
1816 Chapman, Major-Gen. Sir S. R., C.B., K.C.H. Tainfield-house, Somerset
1836 Chapman, J. J., Capt. R.A. Athenæum Club
1842 Chapman, T., F.S.A. Whitby, Yorkshire
1834 Chesney, Lieut.-Colonel F. R., R.A. 11, Wilton-terrace, Grosvenor-place
1807 Children, J. G., F.R.S., F.S.A., F.L.S. 48, Torrington-square
1826 Christie, S. H., M.A., V.P., R.A.S., F.C.P.S. Royal Mil. Acad., Woolwich
1842 Christmas, Rev. H., M.A., F.S.A. Sion College, London Wall
1833 Christopher, R. A. D. 97, Eaton-square

1818 Churchill, F. A., Lord. Cornbury-park, near Witney, Oxfordshire
1832 Clark, Sir J., Bart., M.D., Physician to the Queen. 22 B, Brook-street
1836 Clark, W., M.D. Cambridge
1837 Clark, W. T. Hammersmith
1825 Clarke, Sir C. M., Bart., M.D., LL.D. Wigginton-lodge, Tamworth
1820 Clarke, L. L., M.A. India
1841 Clendinning, J., M.D., Col. Reg. Med. Socius. 16, Wimpole-street
1819 Clerk, Sir G., Bart., D.C.L., M.P., F.R.S.E., F.G.S. 8, Park-street
1848 Clerk, Capt. H., R.A. Woolwich (abroad).
1833 Clerke, Major T. H. S., K.H., R.E., F.R.A.S. 4, Brompton-grove
1823 Clift, W., F.G.S. Stanhope-cottage, Mornington-road, Regent's-park
1820 Cockburn, Vice-Admiral Right Hon. Sir G., G.C.B., G.C.H., F.R.A.S.
1822 Codrington, Vice-Admiral Sir E., G.C.B. Admiralty-house, Portsmouth
1820 Colby, Maj.-Gen., R. E., LL.D., F.R.S.E., Hon. M.R.I.A., F.G.S., F.R.A.S., M.R.A.S., Ordnance Map Office, Southampton
1830 Collier, Charles, M.D., F.G.S. 20, Fitzroy-square
1830 Colquhoun, Lieut.-Colonel J. N., R.A. Athenæum Club
1819 Conybeare, Very Rev. W. D., Dean of Llandaff, M.A., F.G.S. Llandaff
1840 Cook, T., Lieut. R.N., Professor of Fortification, E. I. C. Military Academy, Addiscombe
1829 Cooper, B.B. 2, New-street, Spring-gardens
1832 Cooper, C. P., LL.D., Hon. M.R.I.A. 7, New Boswell-court, Lincoln's-inn
1846 Cooper, S. 7, Woburn-place
1834 Copeland, T. 17, Cavendish-square
1833 Copland, J., M.D. 5, Old Burlington-street
1821 Cotton, W., F.S.A. 3, Crosby-square, Bishopsgate-street
1836 Cox, W. S. Birmingham
1812 Crampton, Sir P. C., D.C.L. Dublin
1818 Crawford, J., F.L.S., F.G.S., M.R.A.S.
1842 Creuze, A. F. B. 14, Grosvenor-place, New-road, Kennington
1800 Crichton, Sir A., Knt., M.D., F.L.S., F.G.S. Seal Chart, Sevenoaks, Kent
1818 Croft, Sir J., Bart., K.T.S., D.C.L. Milgate, near Maidstone
1810 Croker, Right Hon. J. W., LL.D.
1836 Crosse, J. G., M.D. Norwich
1843 Crozier, F. R. M., Capt. R.N.
1844 Crum, W. Thornlie Bank, near Glasgow
1830 Cubitt, W., M.R.I.A., F.R.A.S. 6, Great George-street, Westminster
1807 Cuming, Lieut.-General Hon. J. L.
1816 Cumming, Rev. J., M.A., Professor of Chemistry. Cambridge
1838 Cureton, Rev. W., M.A. 37, Queen Anne-street; and British Museum
1841 Cursetjee, A. Bombay
1828 Daniell, E. R. Birmingham
1822 Dartmouth, W., Earl of, D.C.L., F.S.A. 23, St. James's-square
1834 Darwin, C., M.A., Sec. G.S. Down, near Bromley, Kent
1822 Daubeny, C. G. B., M.D., Hon. M.R.I.A., F.L.S., F.G.S. Oxford
1831 Davies, G. 25, Duncan-terrace, City-road
1833 Davies, T. S., F.R.S.E., F.S.A. Royal Military Academy, Woolwich
1841 Davis, H. 17, Oxford-square, Hyde-park
1822 Davis, Sir J., Bart. Portland-place; and Hollywood, Compton, Bristol
1826 Davy, E., M.R.I.A. Dublin
1814 Davy, J., M.D., F.R.S.E. Ambleside, Westmorland
1815 Dawkins, J.C., F.S.A. Ham-common, Richmond
1805 De Blaquiere, Lord. Holly-house, New Kent-road
1819 De la Beche, Sir H. T., Knt., Vice-President, F.L.S., F.G.S., Director-General of the Geological Survey of the United Kingdom. Museum of Economic Geology, 6, Craig's-court, Charing-cross
1839 Denham, H. M., Commander R.N. 89, Pall-mall; and Athenæum
1841 Denham, Rev. J. F., M.A. 1, New-inn
1838 Denison, Sir W. T., Capt. R.E., F.R.A.S., F.R.G.S. Lieut.-Governor, Van Diemen's Land
1833 Denman, T., Lord. 38, Portland-place; and Stoney Middleton, Derbyshire
1829 D'Eyncourt, Right Hon. C. T., F.S.A. 35, Pall-mall
1845 Dickenson, J., F.G.S., F.R.G.S., F.A.S. Abbott's-hill, Hemel Hempstead
1804 Dillwyn, L. W., F.L.S., F.G.S. Sketty-hall, near Swansea
1832 Disney, J., F.S.A. The Hyde, near Ingatestone, Essex
1811 Dixon, Rev. R., M.A. Niton, Isle of Wight

1835 Dobson, Sir R., Knt. Royal Hospital, Greenwich
1819 Dollond, G., F.R.A.S. 59, St. Paul's-churchyard
1838 Donkin, B., F.R.A.S. 6, Paragon, Kent-road
1842 Donkin, W. F., M.A. Oxford
1830 Douglas, G. Chilston, Kent
1816 Douglas, Major-General Sir H., Bart., C.B., K.S.C., D.C.L., F.S.A. 15, Green-street, Grosvenor-square
1826 Douglas, W. R. K.
1836 Drory, G. W. 38, Westbourne-terrace, Hyde-park
1839 Drummond, H. Aldbury-park, Guildford, Surrey
1808 Duckett, Sir G., Bart., M.A., F.S.A., F.G.S., Hon. M.R.I.S.
1825 D'Urban, Major-General Sir B., K.C.B., K.C.H., K.T.S.
1824 Durham, E. M., D.D., Lord Bishop of, F.S.A. 4, Upper Portland-place
1847 Dwarris, Sir F., Knt., B.A., F.S.A. 5, James-street, St. James's-park
1838 Eastlake, C. L., R.A. 13, Upper Fitzroy-street
1835 Edye, J. 9, Mecklenburg-square
1841 Edye, J.
1831 Egerton, Sir P. de M. G., Bart., F.G.S. 30, Eaton-place
1815 Elliot, Sir W. F., Bart. Stobb's-castle
1834 Elliot, Hon. G., Rear-Admiral. 88, Eaton-place
1829 Elliotson, J., M.D., Coll. Reg. Med. Socius. 37, Conduit-street
1835 Elliott, C. 47, Portland-place
1832 Elliott, Rev. C. B., M.A. 47, Portland-place; and Tattingstone, Suffolk
1811 Ellis, Sir H., K.H., B.C.L., Sec. S.A., Hon. M.R.I.A. British Museum
1819 Ellis, Right Hon. H., F.G.S.
1847 Ellis, T. F., M.A., F.R.A.S., F.C.P.S., Attorney-General of the Duchy of Lancaster. 15, Bedford-place
1832 Elphinstone, Sir H., Bart., M.A., F.G.S.
1841 Enderby, C., F.L.S. Greenwich
1841 Enfield, Viscount. 77, Eaton-square
1829 Enniskillen, W. W., Earl of, D.C.L., F.G.S. Athenæum Club
1827 Everest, Lieut.-Colonel G., Bengal Artillery, F.G.S., F.R.A.S., M.R.A.S. 37, Connaught-square, Hyde-park
1840 Ewer, W. 23, Hanover-square
1845 Falconer, H., M.D., F.L.S., F.G.S., Sup. of the E.I.C. Bot. Gard., Calcutta
1824 Faraday, M., D.C.L., Hon. Mem. R.S.E. & C.P.S., F.G.S. 21, Albemarle-st.
1839 Farre, A., M.D., Coll. Reg. Med. Socius. 22, Curzon-street, May-fair
1835 Featherstonhaugh, G. W. Havre
1816 Fellowes, Sir J., Knt., M.D. Pangbourne-lodge, near Reading
1848 Ferguson, W. King's College
1836 Field, J. Cheltenham-place, Lambeth
1842 Fielding, G. H., M.D. The Bower, Maidstone
1825 Fisher, Rev. G., M.A., F.R.A.S. Royal Hospital, Greenwich
1815 Fitton, W. H., M.D., F.L.S., F.G.S., F.R.A.S. 53, Upper Harley-street
1811 Fitzwilliam, C. W., Earl, F.S.A., F.G.S. Mortimer-house, Grosvenor-place
1839 Fletcher, T. W., F.S.A. Dudley, Worcestershire
1834 Ffolkes, Sir W. B., Bart. Hillington-hall, Lynn
1845 Forbes, E., F.L.S., F.G.S., Prof. of Bot. at King's College. King's College
1832 Forbes, J. D., Professor of Natural Philosophy in the University of Edinburgh, &c. Edinburgh
1829 Forbes, J., M.D., Coll. Reg. Med. Socius. 12, Old Burlington-street
1822 Forbes, W. N., F.G.S.
1828 Forshall, Rev. J., M.A., F.S.A., Hon. M.R.I.A., M.R.S.L. British Museum
1821 Forster, E., V.P.L.S. 11, Mansion-house-street; and Woodford, Essex
1817 Fortescue, H., Earl, K.P. 17, Grosvenor-sq.; and Castlehill, Southmolton
1802 Fowler, R., M.D., F.S.A. Salisbury
1845 Fownes, G., Professor of Practical Chemistry, University College, London
1848 Fox, R. W. Falmouth
1823 Franklin, Sir J., Knt., Capt. R.N., D.C.L., F.L.S., F.R.G.S., F.G.S., F.R.A.S., Acad. Scient. Paris., et Soc. Geogr. Paris. Corresp.
1821 Franks, W., M.A. Wood-hill, Hatfield, Hertfordshire
1837 Frere, G. E. Roydon-hall, Diss, Norfolk
1834 Freshfield, J. W., F.G.S. 15, Regent-street; and Leatherhead, Surrey
1820 Friend, M. C., Lieut. R.N. George Town, Van Diemen's Land
1839 Frodsham, W. J. Change-alley, Cornhill
1834 Galloway, T., M.A., F.R.A.S. 45, Torrington-square

1816 Gardiner, Rev. S. J., M.A.
1839 Gaskin, Rev. T., M.A., F.R.A.S. Jesus College, Cambridge
1840 Gassiot, J. P. Clapham-common
1796 Gibbes, Sir G. S., Knt., M.D., F.L.S. 2, Oriel-place, Cheltenham
1846 Gilbart, I. W. London and Westminster Bank, Lothbury
1834 Gilbert, J. D., M.A. Eastbourne, Sussex; and Trelissick, Truro, Cornwall
1828 Glenelg, C., Lord, D.C.L., M.R.S.L. The Albany, Piccadilly
1838 Glynn, J. Butterley, Derbyshire
1839 Godwin, G., jun., F.S.A. 11, Pelham-crescent, Brompton
1808 Goldingham, J., F.R.A.S., M.R.A.S. Worcester
1828 Goldsmid, Baron de and de Palmeira, F.S.A., F.L.S., F.G.S., F.R.A.S., M.R.S.L. Park-lodge, Regent's-park
1819 Gompertz, B., F.R.A.S. Kennington-terrace, Vauxhall
1846 Goodsir, J., Prof. of Anatomy, Univ. of Edinb. 21, Lothian-st., Edinburgh
1835 Gordon, J. A., M.D., Coll. Reg. Med. Socius. Pelican Life Assurance Office, Lombard-street
1801 Gordon, Lieut.-General Sir J. W., Bart., K.C.B., G.C.H. Chelsea
1830 Gordon, H. P., M.A. Chelsea
1821 Gordon, T. Zante, Ionian Islands
1829 Goulburn, Right Hon. H., D.C.L. Montague-place, Portman-square
1843 Gould, J., F.L.S. 20, Broad-street, Golden-square
1831 Graham, Right Hon. Sir J. R. G., Bart. 46, Grosvenor-place
1836 Graham, T., M.A., *Vice-President*, Professor of Chemistry, University College, London, F.G.S., &c. 9, Torrington-square
1846 Grainger, R. D., F.R.C.S., F.M.C.S. Highgate
1840 Grant, T. T. Royal Clarence Victualling-yard, Portsmouth
1836 Grant, R. E., M.D., F.R.S.E., F.L.S., &c. 10, Grafton-place, Euston-square
1817 Granville, A.B., M.D., F.G.S., M.R.A.S., &c. 109, Piccadilly
1832 Gravatt, W. 34, Parliament-street
1839 Graves, J. T., M.A., M.R.S.L. Poor Law Com. Office, Somerset-house
1832 Gray, J. E., F.G.S., F.R.G.S., &c. British Museum
1825 Green, J. H., Professor of Anatomy to the Royal Academy, F.G.S. Barnet
1807 Greenough, G.B., F.L.S., F.G.S., M.R.A.S. Grove-house, Regent's-park
1833 Greig, W., M.A. 14, Lower Belgrave-street, Eaton-square
1830 Gresswell, Rev. R., M.A. Worcester College, Oxford
1841 Grey, T. P., Earl de, K.G., K.P. 4, St. James's-square
1834 Griffith, E. 6, Nottingham-terrace, Marylebone
1806 Griffiths, J.
1840 Grove, W.R., M.A., V.P.R.I., Ph. D., Acad. Reg. Taurin. Corresp. et Soc. Phil. Basil. 27, Upper Gloucester-place, Dorset-square
1839 Guest, E. 4, King's-bench-walk, Temple
1830 Guest, Sir J. J., Bart., F.G.S. 8, Spring-gardens
1839 Gulliver, G. Royal Regiment of Horse Guards
1818 Gurney, H., F.S.A., M.R.S.L. 9, St. James's-square
1827 Guthrie, G. J. 4, Berkeley-street, Piccadilly
1844 Haddington, Right Hon. T., Earl of, K.P. Tyningham Castle, Dunbar
1820 Hall, Sir J., Bart., F.R.S.E., F.G.S. 63, Lowndes-square
1832 Hall, M., M.D., F.R.S.E., Col. Reg. Med. Socius. 14, Manchester-square
1827 Hall, T. H., M.A. 49, Tavistock-square
1847 Hall, W. H., Capt. R.N. Shipbourne-lodge, Tunbridge
1821 Hallam, H., M.A., Trust. Brit. Mus., V.P.S., F.G.S., F.R.A.S., M.R.S.L., Instit. Reg. Sc. Paris. Socius. 24, Wilton-crescent, Knightsbridge
1839 Halliwell, J. O., Hon. M.R.I.A., F.S.A.L.&E., F.R.A.S., Hon. M.R.S.L., &c. Avenue-lodge, Brixton-hill
1808 Hamilton and Brandon, A., Duke of, K.G., F.S.A. 12, Portman-square
1828 Hamilton, Rev. H. P., M.A., F.G.S., F.R.A.S. Wath Rectory, near Ripon
1813 Hamilton, W. R., V.P.S.A., V.P.R.S.L., &c. 12, Bolton-row, May-fair
1838 Hansler, Sir J. J., Knt., F.S.A. 8, Westbourne-street, Hyde-park-gardens
1824 Harcourt, Rev. W. V. V., M.A., Hon.M.R.I.A., F.G.S. Weldrake, near York
1838 Hardwick, J., D.C.L. 5 K, Albany, Piccadilly
1831 Hardwick, P., R.A., F.S.A. 60, Russell-square
1847 Hardwicke, Earl of. Wimpole-hall, Arrington, Cambridge
1839 Hardy, P. 37, Old Jewry; and 10, Victoria-square, Pimlico
1823 Harford, J. S., D.C.L.
1844 Hargreave, C. J., B.L., Professor of Jurisprudence, University College, London. 69, Chancery-lane

1835 Harris, J. G., M.A. 25, Chester-street
1831 Harris, Sir W. S., Knt. Windsor Villas, Plymouth
1845 Harrison, T. C. 31, York-terrace, Regent's-park
1825 Harvey, H., F.R.A.S. 59, Regency-square, Brighton
1835 Harvey, Major-General Sir R. J., C.B., K.T.S., K.S.B., F.S.A. United Service Club; and Mousehold-house, near Norwich
1827 Harwood, J., M.D., F.L.S. St. Leonard's, Hastings
1812 Hasted, Rev. H., M.A., F.L.S. Bury, Suffolk
1821 Haughton, Sir G. C., K.H., M.A., M.R.A.S., &c. 14, Grafton-street
1834 Hawkins, B., M.D., Col. Reg. Med. Socius. 30, Golden-square
1821 Hawkins, E., F.S.A., F.L.S. British Museum
1791 Hawkins, J.
1830 Hawkins, J. H., M.A., F.G.S. Reform Club
1835 Hawkins, Rev. W., B.L., M.A. 23, Great Marlborough-street
1814 Hay, R. W., F.S.A.
1818 Heath, G. C. Cambridge
1843 Heath, J. B., F.S.A. 66, Russell-square
1846 Henry, T. H. Brick-lane, Spitalfields
1834 Henry, W. C., M.D. Haffield, near Ledbury, Herefordshire
1840 Henwood, W. J. 4, Clarence-street, Penzance
1813 Herschel, Sir J. F. W., Bart., *Vice-President*, D.C.L., M.A., F.R.S.E., Hon. M.R.I.A., F.G.S., M.C.P.S., &c. Collingwood, near Hawkhurst, Kent
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1843 Heywood, Sir B., Bart. 9, Hyde-park-gardens
1839 Heywood, J., F.S.A. Athenæum Club; and Acresfield, Manchester
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1809 Hoare, C., F.S.A. 37, Fleet-street
1814 Hobhouse, Right Hon. Sir J. C., Bart., M.A. 42, Berkeley-square
1811 Hoblyn, T., F.L.S. White Barns, Buntingford, Herts
1841 Hodgkinson, E., F.G.S. 14, Salford-crescent, Manchester
1831 Hodgson, J. Birmingham
1839 Hogg, J., M.A., F.L.S., F.C.P.S., M.R.S.L. 12, King's-bench-walk
1837 Holland, C., M.D. 16, Queen-street, May-fair
1815 Holland, H., M.D., F.G.S., Coll. Reg. Med. Socius. 25, Brook-street
1826 Holman, J., Lieut. R.N., F.L.S. Windsor
1825 Holme, Sir E., Bart., Capt. R.N., F.S.A. 4, Queen Anne-street
1843 Hood, C., F.R.A.S. Earl-street, Blackfriars; and Camberwell
1847 Hooker, J. D., M.D. West Park, Kew
1812 Hooker, Sir W. J., K.H., LL.D., F.S.A., F.L.S., F.G.S. Kew
1834 Hope, Rev. F. W., M.A., F.L.S. 56, Upper Seymour-street
1837 Hopkins, W., M.A. Fitzwilliam-street, Cambridge
1841 Hoppus, Rev. J., LL.D., Ph. D. 39, Camden-street, Camden-town
1834 Horne, J. Clapham-common
1813 Horner, L., F.R.S.E., &c. Rivermede, Hampton-on-Wick
1828 Horsfield, T., M.D., F.L.S., F.G.S., M.R.A.S., &c. 43, Markham-square
1843 Hoskins, S. E., M.D. Guernsey
1821 Howard, L. Bruce-grove, Tottenham; and Ackworth-villa, Pomfret
1834 Hudson, R., F.G.S. Clapham-common
1818 Hume, J. 6, Bryanstone-square
1819 Hunt, Rev. G., M.A., F.S.A. Egg Buckland, near Plymouth
1837 Hunter, R., F.G.S., F.S.A. Highgate
1819 Hustler, Rev. J. D., B.D. Euston Rectory, near Thetford, Norfolk
1829 Hutchinson, Lieut.-col. G., E.I.C.S., Beng. Engineers
1844 Hyet, W. H. Painswick-house, Painswick
1838 Hymers, Rev. J., D.D. St. John's College, Cambridge
1813 Inglis, Sir R. H., Bart., *Vice-President*, D.C.L., Trust. Brit. Mus., Pres. Brit. Assoc. for Advanc. of Science, V.P.S.A., F.R.A.S. 7, Bedford-square
1807 Jacob, W., Inst. Sc. Paris. Corresp. 31, Cadogan-place, Sloane-street
1845 Jackson, Col. J. 52, Coleshill-street, Pimlico
1848 James, H., Capt. R. E. Portsmouth
1826 Jameson, R., F.R.S.E., Hon.M.R.I.A., F.L.S., F.G.S., &c. Edinburgh
1841 Jefferys, J. 25 A, Norfolk-crescent, Hyde-park
1840 Jeffreys, J. G., F.L.S. Norton, near Swansea
1841 Jenkins, Sir R., G.C.B. India-house; and Bicton-hall, Shrewsbury
1821 Jennings, The Ven. Archdeacon, D.D. Hampstead-green

1838 Jervis, T. B., Major E.I.C.E., F.L.S., F.G.S., F.R.A.S. Clifton
1842 Jesse, J., F.R.A.S., F.L.S. Fordsham, Cheshire
1842 Johnson, C. W. 14, Gray's-inn-square
1836 Johnson, E. J., Captain R.N. Clement's-inn
1838 Johnson, Rev. G. H. S., M.A. Oxford
1846 Johnson, P. N., F.G.S. 38, Mecklenburgh-square
1810 Johnston, Right Hon. Sir A., Knt., F.S.A., V.P.R.A.S. 19, Great Cumberland-place; and York-house, Twickenham
1845 Johnston, A. R.
1837 Johnston, J. F. W., M.A., F.R.S., Professor of Chemistry and Mineralogy in the University of Durham. Durham
1846 Jones, H. B., M.A., M.D., Col. Reg. Med. Socius. 30, Lower Grosvenor-st.
1835 Jones, T., F.R.A.S. 62, Charing-cross; and West-square
1844 Jones, T. R., Professor of Comparative Anatomy, King's College. Colney-house, Finchley-common
1840 Jones, T. W. 35, George-street, Hanover-square
1840 Kater, E., F.G.S., M.R.I.A. Mexborough, Yorkshire
1846 Kay, J. H., Lieut. R.N.
1838 Kelland, Rev. P., M.A., F.R.S.E., M.C.P.S., Professor of Mathematics in the University of Edinburgh. Wardle, near Edinburgh
1822 Kidd, J., M.D., F.L.S., F.G.S. Oxford
1834 Kiernan, F. 30, Manchester-street, Manchester-square
1824 King, P. P., Captain R.N., F.L.S. Dunheved, New South Wales
1818 Kirby, Rev. W., M.A., F.L.S., F.G.S. Barham, near Ipswich
1830 Knowles, Sir F. C., Bart., M.A.
1810 König, C., K.H., Hon. M.R.I.A. British Museum
1843 Laing, Rev. D. 62, Mornington-road, Regent's-park
1845 Lankester, E., M.D., F.L.S. 22, Old Burlington-street
1811 Lansdowne, H., Marquis of, K.G., D.C.L., Trust. Brit. Mus., M.R.S.L. 52, Berkeley-square
1844 Larcom, T. A., Capt. R.E.
1848 Latham, R. G., M.D. Upper Southwick-street
1813 Lawrence, W. 18, Whitehall-place
1840 Lawson, H. 7, Lansdowne-crescent, Bath
1815 Leake, Lieut.-Colonel W.M., M.R.S.L., &c. 50, Queen Anne-street
1843 Le Couteur, Col. J. Belle Vue, Jersey
1831 Lee, J., LL.D., F.R.A.S. 5, College, Doctors'-commons
1830 Lee, R., M.D., Coll. Reg. Med. Socius. 4, Saville-row
1820 Lefevre, J. G. S., M.A., Vice-Chan. of the Univ. of London. Board of Trade
1848 Lefroy, J. H., Capt. R.A. Canada
1817 Legh, T., D.C.L. Lyme-park, Cheshire
1822 Lemon, Sir C., Bart. 46, Charles-street, Berkeley-square
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1811 Lincoln, J. K., Lord Bishop of. Cambridge
1828 Lindley, J., Phil. D., F.L.S., &c. 21, Regent-street
1832 Lister, J. J. Upton, Essex
1836 Llewelyn, J. D., F.L.S. Penllegare, Glamorgan
1818 Lloyd, E., Captain R.N. United Service Club
1830 Lloyd, Lieut.-Col. J. A., Surveyor-General. Port Louis, Mauritius
1834 Lloyd, Rev. W. F., M.A. Missenden, Bucks
1836 Lloyd, Rev. H., M.A., M.R.I.A. Dublin
1838 Locke, J. 6, Chester-terrace, Regent's-park
1811 Locker, E. H., F.S.A.
1810 Lonsdale, W., Earl of. 14, Carlton-terrace; and Lowther Castle, near Penrith
1841 Lovelace, W. K., Earl of. East Horsley-park, Ripley, Surrey
1834 Lowe, G. 39, Finsbury-circus
1829 Lubbock, Sir J. W., Bart., M.A., F.L.S., F.R.A.S., M.R.A.S. 23, St. James's-place
1826 Lyell, C., jun., M.A., F.L.S., F.G.S. 11, Harley-street, Cavendish-square
1826 Lyndhurst, J. S., Lord, D.C.L. 25, George-street, Hanover-square
1840 Littleton, G. W., Lord. 17, St. James's-pl.; and Hagley-park, Worcestersh.
1816 MacGrigor, Sir J., Bart., F R.S.E., Coll. Reg. Med. Socius. 3, Harley-street
1815 Mackenzie, Sir G. S., Bart., F.R.S.E. Coul, Ross-shire
1827 Mackinnon, W. A., M.A., F.S.A., F.G.S. 4, Hyde-park-place
1831 Maclear, T., F.R.A.S., Astronomer Royal at the Cape of Good Hope
1839 Mackmurdo, G. W. St. Thomas's Hospital; and 7, New Broad-street

1838 Macneill, Sir J., F.R.A.S., M.R.I.A. 28, Rutland-square, Dublin
1848 M'William, J. O., M.D. Trinity-square, Tower-hill
1832 Madden, Sir F., K.H., Hon. M.R.I.A, F.S.A., &c. British Museum
1817 Maddy, Rev. J., D.D., F.S.A., F.R.A.S. Somertown, Bury St. Edmund's
1819 Magrath, Sir G., K.H., M.D., M.R.I.A., F.L.S., F.G.S. Plymouth
1827 Mahon, P. H., Viscount, D.C.L., P.S.A. 41, Grosvenor-place
1847 Maitland, J. G., M.A. 8, New-square, Lincoln's-inn
1839 Maitland, Rev. S. R. Lambeth-palace
1829 Maitland, E. F., F.S.A. Henley-on-Thames, Oxfordshire
1821 Majendie, A., F.G.S. Hedingham-castle, Castle Hedingham, Essex
1831 Manby, G. W., Capt. R.N. Yarmouth
1825 Mangles, J., Capt. R.N. 66, Cambridge-terrace, Edgeware-road
1825 Mantell, G. A., LL.D., F.L.S., F.G.S., &c. 19, Chester-square, Pimlico
1836 Marcet, F. Geneva
1816 Markland, J. H., F.S.A. Bath
1845 Martin, J. R., F.R.M. &C.S., M.R.A.S. 71 A, Grosvenor-street
1823 Maskelyne, A. M. S., M.A. Basset Down-house, Swindon
1846 Matheson, J. 13, Cleveland-row
1832 Mauley, W. F. S., Lord de. 24, George-street, Hanover-square
1829 Maxwell, Sir J., Bart. Pollock, Renfrewshire
1827 Mayo, Rev. C., B.D., F.S.A. Colesgrove, Hertfordshire
1835 Mayo, T., M.D., Col. Reg. Med. Socius. 56, Wimpole-street
1841 Melvill, J. C. East-India-house
1817 Melville, R., Viscount, K.T., F.R.A.S. 3, Somerset-place
1838 Merewether, Very Rev. J., D.D., Dean of Hereford, F.S.A. Hereford
1843 Miers, J. Temple-lodge, Hammersmith
1843 Miller, J. Monastery-cottage, East-India-road
1827 Miller, Lieut.-Col. G., C.B.
1845 Miller, W. A., M.D., Professor of Chemistry. King's College, London
1838 Miller, W. H., M.A., Professor of Mineralogy. Cambridge
1836 Minto, G. E. M. K., Earl of, F.R.A.S. Minto-castle, Roxburghshire
1835 Molesworth, Sir W., Bart. 1, Lowndes-square
1841 Monteagle (of Brandon), T., Lord, F.S.A. 37, Lower Brook-street
1845 Monteith, Maj.-Gen. W.
1836 Montefiore, Sir M., Knt. 7, Grosvenor-gate, Park-lane
1835 Moore, G., F.S.A., F.L.S. 64, Lincoln's-inn-fields
1846 Moore, Major J. A., F.S.A. 23, Park-crescent, Portland-place
1827 Moreau, C., Acadd. Reg. Divion., Burd., et Masil., Socius. Paris
1835 Morgan, A. 26, New Bridge-street, Blackfriars
1832 Morgan, O. S., M.A., F.S.A. 70, Pall-mall
1819 Morier, J. 22, Charles-street, Berkeley-square
1842 Morison, Maj.-Gen. W., C.B., F.R.S.E. Oriental-club; or 16, Saville-row
1831 Morris, J. C. 9, Upper Hyde-park-street
1839 Moseley, Rev. H., M.A. Wandsworth
1830 Moss, J. W., M.B. Dudley
1847 Mountcashel, S., Earl of. Moore-park, Kilworth, Cork
1822 Mudge, R. Z., Lieut.-Col. R. E. Beechwood, Plympton, Devon
1826 Murchison, Sir R. I., G.C.St.S., M.A., V.P.G.S., F.L.S., &c. 16, Belgrave-sq.
1826 Mylne, W. C., F.R.A.S. New River-head
1820 Napier, H., Capt. R.N. Cadogan-place
1840 Narrien, J., F.R.A.S., Professor of Mathematics in the Royal Military College, Sandhurst. Sandhurst
1846 Neilson, J. B. Glasgow
1842 Newbold, T. J., Lieut. E.I.C.S. Madras
1846 Newport, G., F.L.S., F.R.C.S., &c. 30, Southwick-street, Oxford-terrace
1833 Nolan, Rev. F., LL.D., M.R.S.L. Prittlewell, Essex
1842 Norfolk, The Most Noble H., Duke of. 1, Hyde-park-place
1830 Northampton, S. J. A., Marquis of, F.S.A., Hon. M.R.I.A., F.L.S., F.G.S., &c. 145, Piccadilly
1823 Northumberland, A., Duke of, F.S.A. Northumberland-house, Strand
1840 Norwich, E. S., Lord Bishop of, President of the Linnean Society. 38, Lower Brook-street
1826 Ogle, J. A., M.D., F.R.A.S. Lord Lichfield's and Aldrich's Professor of Medicine, Oxford
1848 Oldham, T. Trinity College, Dublin
1835 Oliveira, B., F.S.A. 8, Upper Hyde-park-street

1824 Orford, H., Earl of. White's Club; and Wolterton-park, Norfolk
1819 Ormerod, G., D.C.L., F.S.A., F.G.S. Sudbury-park, Gloucestershire
1843 O'Shaughnessy, W. B., M.D. Calcutta
1838 Outram, B. F., M.D., F.R.G.S. 1, Hanover-square
1834 Owen, R., M.D., LL.D., F.L.S., V.P.G.S., &c. Royal College of Surgeons, Lincoln's-inn-fields
1845 Oxford, S. W., Lord Bishop of. 61, Eaton-place
1821 Palgrave, Sir F., K.H., Deputy Keeper of Her Majesty's Records. Rolls-yard, Chancery-lane; and Hampstead-green
1821 Paris, J. A., M.D., Pres. of the Royal College of Physicians. 27, Dover-st.
1824 Parish, Sir W., K.C.H., F.S.A., F.G.S.
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Attwood, M., M.P. Muswell-hill, Mid.
Auldjo, J., F.R.S. Noel-ho., Kensington
Austen, R. A. C., B.A. Merrow-house, Guildford
Austin, Maj. T. 1, Paul-st., Kingsdown
Aveline, W. T.
Aylmer, G. W. 47, Upper Grosvenor-sq.
Ayrton, F., Lt. B.A. 3, Garden-ct., Temple
Baber, J. 1, South-place, Knightsbridge
Babington, C. C., M.A., F.L.S. St. John's College, Cambridge
Babington, W., M.R.A.S.
Bainbridge, W. Newcastle-upon-Tyne
Baker, J. L., jun. Hardwicke Court, Gloucestershire
Baker, W. Bridgewater
Bald, R., C.E. 14, Albany-st., Edinbro'
Bald, W.
Barber, E. S., C.E. Newport, Monmouth
Barchard, J. H. Putney-heath
Barclay, A. K. Bury-hill, Kent
Barclay, C., F.S.A., M.R.A.S. Dorking

Barlow, Rev. J., M.A., F.R.S. & L.S. 6, Berkeley-street
Barlow, P. W. 2, Manchester-buildings
Barnes, G., D.D. Sowton Rectory, Exeter
Barnes, Rev. J. W. Cambridge
Basterot, Baron De. Rue de la Ville l'Evêque, No. 14, Paris
Bateman, J. F. Manchester
Beardsley, A. Langley, Derbyshire
Beardmore, N. 13, Great College-st.
Beaufort, F., Admiral, R.N., F.R.S. 11, Gloucester-place
Beaumont, J. A. 50, Regent-street
Beaumont, T. W., F.H.S. 144, Piccadilly
Belcher, Sir E., Capt. R.N.
Bell, F. J. Woodlands, Essex
Bell, M. Bourne-court, Kent
Bell, T., F.R.S. & L.S. 17, New Broad-st.
Bentley, John
Berkeley, J. J. Uttoxeter
Best, B. Withymoor-house, near Dudley
Bettington, A. Bombay Civil Service
Bicheno, J. E., F.R.S. & L.S. Col. Sec., Hobart Town
Bigge, C. W. Linden-house, Morpeth
Bigge, T.
Bigge, Capt. T. E. 19, Bryanston-sq.
Bigsby, J. J., M.D. 24, Dorset-place
Bilke, E. 12, Stamford-street
Billing, A., A.M., M.D. 6, Grosv.-gate
Bilton, Rev. W., M.A.
Birch, J. B. 3, Cannon-row
Black, J., M.D. Manchester
Blackburn, E. B.
Blackwell, Samuel
Blackwell, T. E. Foxhangers, Wilts
Blake, W., M.A., F.R.S. & H.S. 62, Portland-place
Blake, W. J., jun., F.R.S. 62, Portland-pl.
Bland, M., F.R.S., S.A., L.S., & H.S.
Bland, T.
Blanshard, H., M.R.A.S. 37, Great Ormond-street
Blencowe, R. W., M.A.
Blount, W.
Boase, H., M.D., F.R.S. Claverhouse, near Dundee
Bodley, T. Anlaby-house, Pittville, Cheltenham
Boileau, Sir J. P., Bart. 20, Upper Brook-street, Grosvenor-square
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Booth, J., M.D. Birmingham
Botfield, B., M.P., F.R.S. & L.S. 9, Stratton-street
Bowerbank, J.S., F.R.S. 3, Highbury-grove, Islington
Bowles, W., F.L.S. & H.S.
Braddyll, T. R. G.
Braikenridge, G. W., F.S.A. Brislington, near Bristol
Brandram, T. Lee, near Blackheath
Bravender, J. Cirencester, Gloucester
Brayley, E. W., F.L.S. 12, East de Beauvoir-square
Breton, W. H., Lieut. R.N.
Breadalbane, J. C., Marquis of, F.R.S. 21, Park-lane
Brewster, Sir D., K.C.H., LL.D., F.R.S. St. Leonard's College, St. Andrew's
Brickenden, R. T. W. L. Warninglid-house, Cuckfield, Sussex
Briggs, Maj.-Gen. J., F.R.S., M.R.A.S. 24, Conduit-street
Bright, R., M.D., F.R.S. 11, Saville-row
Bristow, H. W. Ordnance Geolog. Surv.
Broderip, W. J., M.A., F.R.S. & L.S. 2, Raymond-buildings, Gray's-inn
Brodie, Rev. P. B., M.A. Down Hatherley, near Gloucester
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Brooke, Sir A. B., Bart., M.A., F.R.S. & L.S. Oakley, near Kettering
Brooke, H. J., F.R.S. & L.S. Clapham Rise
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Browne, Rev. R. W., M.A.
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Buckman, J. Birmingham
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Bull, Rev. J., M.A. Newport Pagnell, Bucks
Bunbury, C. J. F., F.L.S. Manor-house, Milden-hall, Suffolk
Bunbury, E.H., M.P., M.A. 15, Lincoln's-inn-fields
Bunbury, Lieut.-Gen. Sir H. E., Bart., K.C.B., F.S.A., L.S., & H.S. Great Barton, near Bury St. Edmund's
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Burney, the Ven. Archdeacon, D.D., F.R.S., S.A., & L.S. Sible Hedingham, near Halstead
Burrow, Rev. E. J., D.D., F.R.S., & L.S. Gibraltar
Burton, D., F.R.S. & S.A. 6, Spring-gardens
Busby, A. Cassilis, Hunter's River, New South Wales
Cabbell, T. 1, Essex-court, Temple
Cadell, W. A., F.R.S. L. & E. Edinbro'
Caldcleugh, A., F.R.S. & L.S. Chili
Calder, J.
Carey, P. S., M.A. Candie, Guernsey
Carne, J., F.R.S., M.R.I.A. Penzance
Carnegy, C., M.D.
Carpenter, W. B., M.D., F.R.S. 6, Regent's-park-terrace
Cartmell, Rev. J. Cambridge

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Cartwright, Sir T. Stockholm
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Cawdor, J. A., Earl, B.A., F.R.S. & H.S. 74, South Audley-street
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Chambers, W. Edinburgh
Chance, E. J., F.L.S. 59, Old Broad-st.
Chapman, T. Arundel-street
Charlesworth, E. Museum, York
Charters, S., Major, R.A.
Cheney, R. H. Badger-hall, Shiffnal
Clark, E. Sandgate
Clarke, Sir C. M., Bart., M.D., F.R.S. 14, New Burlington-street
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Clarke, Rev. W. B., M.A. Paramatta, Australia
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Colby, T., Maj.-Gen. R.E., LL.D., F.R.S. L. & E., M.R.I.A. Ordnance Map-office, Southampton
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Coles, J. Stonehouse, Devonshire
Collard, T. W. St. George's-place, Canterbury
Collett, T.
Collier, C., M.D., F.R.S. 20, Fitzroy-sq.
Collings, W. T. Trinity-college, Camb.
Colthurst, J. Gateshead, Newcastle
Conybeare, J. C. 7, Chancery-lane
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Cooke, Rev. R. B. Wheldrake Rectory, Escrick
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Copland, W. Edinburgh
Cox, J. Wisbeach
Cox, T., M.D. 2, Stanhope-place
Coxe, L. S. 4, Brunswick-place
Craig, J. Glasgow
Crane, G. Yniscedwyn Iron-works, Swansea
Craufurd, W. P. 56, Upper Berkeley-st.
Crawshay, W., jun. Cyfarthfa Iron-works, Merthyr-Tydvil
Crichton, Sir A., K.S.W., M.D., F.R.S. & L.S. The Grove, Seal Chart, Sevenoaks
Crichton, A.
Crompton, C. 10, Endsleigh-street
Cubitt, W. Gray's-inn-lane
Cubitt, W., F.R.S., M.R.I.A. 6, Great George-street
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Cumming, Rev. J. G., M.A. Isle of Man
Cumming, Sir W. G., Bart. Altyre, nr. Forres
Cunliffe, B., jun.
Cunningham, G.
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Cure, C. 2, Devonshire-place
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Dansey, Rev. W., M.B. Donhead, St. Andrew, Wilts
Darwin, C., M.A., F.R.S. Down, Kent
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Daun, R., M.D. Chanonny, Old Aberdn.
Davey, R. Redruth
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Dawes, M. Westbrook
Dawes, Rev. R., M.A.
Dawson, G. Edgbaston, Birmingham
Dawson, R., Capt. R.E. North End, Fulham
Day, Rev. J. D., B.A. Vicarage, Ellismore
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Deck, Mr. I. Cambridge
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Dennys, N. 3, Ampthill-square
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Dickinson, J. Nithsdale, Ayrshire
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Dikes, W. H. Wakefield
Dillwyn, L. L., F.L.S. Burrows-lodge
Dillwyn, L. W., F.R.S. & L.S. Sketty Hall, Swansea
Dobinson, J. Egham-lodge
Dorrington, J., M.A., F.L.S. Linton, Cambridgeshire
Downing, F. The Priory, Dudley
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Duncan, P., M.A. Bath
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Egerton, Sir P. de Malpas G., Bart., M.P., F.R.S. Oulton-park
Egerton, Rev. T. Dunnington Rectory
Egerton, Rev. W. H. Whitechrch., Salop
Eliot, Lieut.-Col. W. G. Hastings
Ellis, F. J., B.A.
Ellis, Right Hon. Sir H., K.C.B., F.R.S. Kingston-on-Thames
Ellismere, Earl of. 18, Belgrave-square
Elphinstone, Sir H., M.A., F.R.S., Bonn.
Elwyn, H. Sydney

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Emerson, A.L., M.D.
England, Rev. T., M.A. Parkhurst
Enniskillen, W. W., Earl of, D.C.L., F.R.S. Florence-court
Enys, J. S. Enys
Erle, Rev. C., M.A. Hardwicke-rectory, Aylesbury
Esmead, G. F.
Essex, A., Earl of
Evans, J. 32, Hertford-street
Evans, Rev. R., M.A.
Evans, W., M.P. Park-house
Everest, G., Lieut.-Col., Hon. E.I.C.S., F.R.S. Winkfield
Everest, Rev. R.
Ewer, W., F.R.S. 8, Portland-place
Eyre, G. E. Warren's Stony Cross
Eyton, T. C., F.L.S. Eyton, Wellington
Falconer, H., A.M., M.D., F.R.S.
Falconer, T. Wootton, Hampshire
Faraday, M., D.C.L., F.R.S. Royal Institution, Albemarle-street
Farrer, J. W. 7, John-street
Faulkner, C. Museum, Deddington
Fearn, S. W. Derby
Fearon, J. P. 34, Great George-street
Featherstonhaugh, G. W., F.R.S.
Fennell, Rev. R. Worthing
Fenwick, T. Newcastle-upon-Tyne
Finch, F.
Fisher, J. Hackney
Fisher, J. C. Wood-hall, Cockermouth
Fisher, Rev. J. H., M.A. Kirkby Lonsdale
Fitch, R. Norwich
Fitton, W. H., M.D., F.R.S. & L.S. 53, Upper Harley-st.
Fitzwilliam, C. W., Earl, F.R.S., S.A., & H.S. Mortimer-house
Fletcher, T.W., F.R.S., P.S.A. Dudley
Floresi, D. Mexico
Floyer, J., B.A. Stafford
Forbes, E., F.R.S.
Forbes, J. D., F.R.S.
Forbes, J. H. Merry Oak, Southamp.
Forbes, J., M.D., F.R.S. 12, Old Burlington-street
Forbes, W. N., F.R.S. Blackford, Aberdeen
Forster, F. Bangor, South Wales
Forster, W.
Foster, J. Stourton-castle, Staffordsh.
Fothergill, R. Lowbridge-ho., Kendal
Fowler, J. 2, Queen's-square-place
Fox, G. C., F.H.S. Grove-hill, Falmth.
Franklin, Sir J., Capt. R.N., K.C.H., D.C.L., F.R.S. & L.S.
Fraser, J. B., M.R.A.S. Moniack
Fraser, C. 38, Conduit-street
Freeland, H. W. 19, Duke-street
Frere, E. Bitton
Freshfield, J. W., F.R.S. Bank-street
Galland, B. H.
Galton, Lieut. D., R.E. 20, Duke-street
Gaskell, J. D.
George, J. D. 32, Old Burlington-st.
Gesne, A., M.D. St. John's, N.Brunsw.
Gibson, T. F. 31, Westbourne-terrace
Gibson, W. S. Newcastle-upon-Tyne
Gilbert, J. D., M.A., F.R.S. Eastbourne
Gilbert, Rev. N. Antigua
Gladdish, W. Gravesend
Goldsmid, Sir I. L., Bart., F.R.S., S.A. & L.S. Park-lodge
Goodhall, H.E. 4, LaurencePountney-pl.
Gordon, L. D. B. Glasgow
Gore, M. Barrow-court, Bristol
Gowen, J. R., F.H.S.
Gower, A. L. 31, Finsbury-square
Graham, T., F.R.S. 9, Torrington-sq.
Grant, C. W., Capt. B.E. India
Grant, Sir J. M., Bart. Ballindalloch
Grant, R. E., M.D., F.R.S.L. & E., & L.S. 10, Seymour-place North
Grantham, R. B. 2, Robert-street
Granville, A.B., M.D., F.R.S., M.R.A.S. 109, Piccadilly
Gray, W., jun. York
Green, J. H., F.R.S. Hadley
Greenough, G. B., F.R.S., L.S., & H.S., M.R.A.S. Regent's-park
Greg, R. H. Manchester
Griffin, T.
Griffith, J. 16, Finsbury-place South
Griffith, R. C., M.D. 10, Gower-st.
Griffith, R. J. Dublin
Grote, A. Clapham-park
Grote, G., M.A.
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Guise, W.V. Elmore-court, Gloucester
Gurdon, J. Ryde, Isle of Wight
Gwatkin, Rev. R., B.D. Barrow-on-the-Soar
Hale, R. B., M.P. 15, Bolton-street
Hall, J. 40, Brewer-street
Hall, Sir J., Bart., F.R.S. 6, Lowndes-square
Hallam, H., M.A., F.R.S., & V.P.S.A. 24, Wilton-crescent
Hambrough, A. Isle of Wight
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Hamilton, Rev. H. P., M.A., F.R.S., L. & E. Wath, Yorkshire
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Hamond, W. P.
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Harcourt, E. V. V. Uxley-hall, Scarbro'
Harcourt, G. G., M.P. 24, St.James's-pl.
Harcourt, Rev. W. V. V., M.A., F.R.S. Wheldrake, York
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Hardwick, P., F.R.S. & S.A. 60, Russell-square
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Hare, The Ven. Archeacon J. C., M.A. Hurstmonceaux, Sussex

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Harris, W.
Harris, W. Charing, Kent
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Harrison, T., F.L.S. & H.S. Treas.-ch.
Hartwell, F.
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Hawkins, T.
Hawkshaw, J. Islington-house, Manch.
Heath, J. M., F.L.S. Madras
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Hertzog, W. F. Cape of Good Hope
Hervey, Lord C.
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Hill, Rev. E., B.A. Christ-church, Oxf.
Hill, G.
Hincks, Rev. T. D., LL.D. Belfast
Hincks, T. C. Breckenbrough, Thirsk
Hodgkinson, E., F.R.S. 14, Crescent, Manchester
Holbech, W. Farnborough
Holl, W. Edgbaston
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Hollier, R. Maize-hill, Greenwich
Hony, Rev. W. E., M.A. Baverstock
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Hope, H. T. 1, Mansfield-street
Hopkins, E., C.E.
Hopkins, W., M.A., F.R.S. Fitzwilliam-street, Cambridge
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Humble, W., M.D.
Hunt, Z. D. Aylesbury
Hunter, R., F.R.S. & S.A., M.R.A.S. Highgate
Hunter, W. P.
Hutton, T., Capt. Bng. Army. Massooree
Hutton, R., M.R.I.A. Putney-park
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Ibbetson, L. L. B. Clifton-ho., Old Brmp.
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Jackson, A. W. Tunbridge-wells
James, H., Capt. R.E. 30, Norfolk-cres.
James, Rev. E. Alton-vicarage
Jameson, R., F.R.S. Edinburgh
Jardine, J., Civil Engineer. Edinburgh
Jeffreys, J., F.R.S. 27A, Norfolk-cresc.
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Jenkyns, Rev. H. Colchester
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Johnston, A. K. Edinburgh
Johnstone, E., M.A.
Johnstone, Sir J. V. B., Bart., M.P. 27, Grosvenor-square
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Joyce, T. Bath
Jukes, J. B., B.A.
Kater, E., F.R.S., M.R.A.S. 1, Somers-pl.
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Kell, W. G. 43, Bedford-row
Keogh, C.
Kenyon, J. 40, York-terrace
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King, J., M.A. Cambridge
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Lambert, J. Blackheath-park
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Lane, C. B., B.A.
Llandaff, the Very Rev. the Dean of
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Langdale, H., Lord. Templeton-hall, Roehampton
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Laurance, J. Elton, Stilton
Laverack, W. T. Swinefleet, Goole
Leake, G. Swan-river
Lee, J., LLD., F.R.S. 5, College, Doctors'-commons
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Lefevre, H. F. S. 44, Eaton-place
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Lewis, W. A., B.A. Wolverhampton
Lewis, Sir T. F., Bart. 21, Grafton-st.
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Lindley, W. 8, Adelphi-terrace
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Lingwood, R. M., M.A., F.L.S. Lyston-house, Herefordshire
Lloyd, E. 34, Bedford-place
Lloyd, G., M.D. Stank-hill, Warwick
Loch, G. 12, Albemarle-street
Loch, J., M.P. 12, Albemarle-street
Lodge, Rev. J., M.A. Stand-ho., Newc.
Loftus, W. K.
Logan, W. E.
Logan, J. R. Singapore
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Beardmore, Nath., 13, Gt. College-street, Westminster
Bertram, Thomas Hardy, Reading
Bidder, G. P., 24, Great George-street
Birkinshaw, John Cass, York
Blackadder, W., Glammis, Forfarshire
Blackwell, Thomas Evans, Foxhangers, Chippenham
Blom, Colonel Frederick, Stockholm
Bodmer, J. G., Chorlton-on-Medlock
Borthwick, M.A., 26, Charles-street, St. James's
Bourns, C., 18, Charlemont Mall, Dublin
Braithwaite, John, 39, Bedford-square
Braithwaite, F., Adam-street, Adelphi
Bray, William Bayley, Italy
Bremner, James, Harbour-place, Wick, Caithness
Brooks, William Alexander, Guildhall, Newcastle-on-Tyne
Brunel, I. K., Duke-street, Westminster
Brunton, Robert, 25, Parliament-street
Brunton, Wm., Newport, Monmouthsh.
Buck, George W., Ramsay, Isle of Man
Burges, A., 23, Great George-street

Bury, Edward, Boston
Carpmael, William, 4, Old-square
Caseborne, Thomas, Stockton-on-Tees
Cawley, Charles Edward, John Dalton-street, Manchester
Chisholm, J., Cape-town, C. of G. Hope
Cini, T., Florence
Clark, William Tierney, West Middlesex Water-works, Hammersmith
Clegg, Samuel, 24, Regent's-square
Clegg, S., jun., 24, Regent's-square
Clegram, W., Saul Lodge, Frampton-upon-Severn, Gloucestershire
Clegram, William Brown, Gloucester
Colthurst, Joseph, 24, Abingdon-street
Combe, J., 3, Cambridge-terrace
Conrad, Frederick Willem, the Hague, Holland
Coode, John, Weymouth
Cooper, James, 23, Great George-street
Cubitt, Wm., Great George-street
Cubitt, Joseph, Great George-street
Daglish, Robert, Orrell-cottage, Wigan
Dalrymple, G. S., 2, Manchester-build.
Davison, Robt., 41, Gracechurch-street
Dixon, E., Engineer's Off., Leamington
Dobson, George Clarisse, Holyhead
Dockray, R. B., Rail. Off., Euston-sq.
Donkin, Bryan, jun., Blue Anchor-road, Bermondsey
Donkin, John, Peckham Stile
Drory, G. W., Belgium
Easton, A., Sutton Newport, Shropshire
Edwards, G., 37, Great George-street
Elliott, J., Dymchurch, Kent
England, J., 7, George-yard, Lombard-st.
Errington, John Edw., 6, Pall Mall East
Fairbairn, William, Manchester
Farey, John, 67, Guildford-street
Fenton, James, Railway Foundry, Leeds
Field, J., Cheltenham-place, Lambeth
Forbes, Col. William Nairne, Mint, Calcutta
Forster, Frank, Bangor
Forster, T. E., 7, Ellison-pl., Newcastle
Fowler, J., jun., 2, Queen-square-place
Fowler, H., Great Grimsby
Fox, Charles, 8, New-street
Froude, W., Dartington, Totness, Devon
Fulton, Hamilton H., 8, Gt. Queen-st.
Galloway, John Alexander, West-street
Gibb, Alexander, Aberdeen
Gibb, John, Aberdeen
Giles, Alfred, 3, Ulster-terrace
Giles, George, Lincoln
Glynn, Joseph, Westbourne-park-villas
Godwin, John, Belfast
Gooch, T. L., 24, Great George-street
Goodrich, Simon, Lisbon
Gordon, Alex., 22, Fludyer-st., Westmr.
Grainger, Thos., 119, George-st., Edinb.
Grantham, Richard B., 12, Robert-street
Gravatt, William, 34, Parliament-street
Greaves, C., 11, Bloomsbury-square
Green, John, Queen-square, Newcastle-on-Tyne
Gregory, C. Hutton, 1, Delahay-street
Grève, Antoine, the Hague, Holland
Griffith, Richard, Dublin
Haden, George, Trowbridge, Wiltshire
Hague, John, Constantinople
Hall, Sidney, 15, St. Mary-axe
Halpin, George, Ballast Board, Dublin
Handiside, William, South-street, Chichester
Hardwick, Philip, 60, Russell-square
Harris, J., Railway Office, Darlington
Harrison, T. E., Whitburn, near Sunderld.
Harrison, J. T., Pilgrim-st., Newcastle
Hartley, John Bernard, Lord-st., Liverp.
Harvey, Niche, Hayle Foundry, Cornwall
Hawkins, J. I., 335, Forth-st., New York
Hawkshaw, John, Islington, Salford, Manchester
Hawksley, T., New Trent Water-works, Nottingham
Hawthorn, Robert, Elswick-lodge, Newcastle-on-Tyne
Hemans, G. W., 53, Up. Sackvill-st., Dublin
Hewett, D. P., 23, Great George-street
Hick, John, Bolton-le-Moors
Hood, Robert Jacomb, Railway Station, London-bridge
Hopkins, Rice, Parliament-street
Humphrys, E., Royal Dockyard, Woolwich
Hunter, Walter, Bow
Irvine, Col. B. E., Admiralty, Somerset-ho.
Jee, Alfred S., 6, John-street, Adelphi
Jones, Harry D., Lieut.-Col. R.E., H.M. Chief Com. of Public Works, Dublin
Jones, James, Carr-street, Ipswich
Jones, Rhys William, Loughor, Swansea
King, Alfred, Gas-works, Liverpool
Lagerheim, Captain G., Gotha Canal, Sweden
Landmann, G., Col. R.E., 42, Fish-st.-hill
Lanyon, Charles, Donegal-sq., Belfast
Leather, George, Leeds
Leather, John Wignall, Leeds
Leslie, James, 56, George-st., Edinburgh
Lewin, William, Boston, Lincolnshire
Lindley, William, 8, Adelphi-terrace
Lloyd, Thos., Admiralty, Somerset-ho.
Locke, Joseph, M.P., Adam-st., Adelphi
Lowe, George, 39, Finsbury-circus
Lynde, James G., 30, Great George-st.
Mackain, Daniel, Water-works, Glasgow
Mackenzie, W., 74, Grove-st., Liverpool
Mackintosh, Alexander, Gresford, Wrexham
Macneill, Sir John, Rutland-sq., Dublin
Mallet, Robert, Capel-street, Dublin
Manby, Edward Oliver, Madrid
Martin, Albinus, Guildford, Surrey
Matthew, John, 19, Valentine-terrace, Blackheath-road
Maudslay, Henry, Cheltenham-place, Lambeth
Maudslay, J., Cheltenham-pl., Lambeth
May, George, Clachnaharry, Inverness
May, Charles, Ipswich

M'Clean, J. R., 17, Great George-street
Meredith, George, Grantham, Lincolnshire
Miller, G. M., 10, Rathannes-rd., Dublin
Miller, John, 132, George-st., Edinburgh
Miller, Joseph, Monastery-cottage, East-India-road, Poplar
Mitchell, A., Belfast
Moorsom, Captain William Scarth, 17½, Great George-street
Murray, A., RoyalDockyard,Portsmouth
Murray, John, 26, Parliament-street
Mylne, Wm. Chadwell, New River Head
Napier, Robert, Vulcan and Lancefield Foundries, Glasgow
Neilson, James B., Gas-works, Glasgow
Nicholson, Robert, Royal Arcade, Newcastle-on-Tyne
Oldham, James, Parliament-st., Hull
Page, George Thomas, Harbour Works, Leith
Page, Thomas, 2, Middle Scotland-yard
Palmer, Geo. H., 8, Westbourne-villas, Harrow-road
Parkes, Josiah, 11, Great College-street
Peacock, Richard, Manchester, Sheffield, and Lincolnshire Rail., Manchester
Peel, George, Soho, Manchester
Peniston, Wm. Mich., Yeovil, Somerset
Penn, John, Greenwich
Penson, Thomas, Oswestry, Salop
Perkins, Jacob, 21, Great Coram-street
Phipps, G. H., 16, Park-road, Stockwell
Potter, James, Brigg, Lincolnshire
Provis, Wm. Alex., The Grange, Ellesmere, Salop
Radford, William, Regent's Canal Office, City-road
Radford, William, 30, Cooper-st., Manchester
Rastrick, John Urpeth, 51, Eaton-square
Redman, John B., 5, New Palace-yard
Rendel, James M., 8, Great George-street
Rennie, George, 21, Whitehall-place
Rennie, Sir John, 15, Whitehall-place
Renton, Henry, 5, South Parade, Leeds
Rhodes, Thomas, 2, Vesey-place, Monkstown, Dublin
Richardson, Joshua, Neath, S. Wales
Richardson, Robert, Bures, Suffolk
Roberts, R., Globe Works, Faulkner-street, Manchester
Robertson, Henry, Chester
Robinson, Stephen, Hartlepool, Durham
Robson, Neill, St. Vincent-st., Glasgow
Roentgen, Gerhard Morris, Rotterdam
Russell, J. S., John-street, Adelphi
Samuel, James Willoughby, Tottenham, Middlesex
Scamp, William, 21, Wellington-terrace, St. John's-wood
Seaward, J., Canal Iron-works, Limeho.
Sherrard, J.C., 74, Blessington-st. Dublin
Simms, Frederick Walter, Calcutta
Simpson, J., 29, Gt. George-st., Westmr.
Simpson, W., 5, Eccleston-street South
Smith, James, Gwyder-house, Whitehall
Smith, Adam Brigg, Lincolnshire
Smith, T. McDougall, 1, Chapel-place
Sopwith, Thomas, Allenheads, Haydon-bridge, Northumberland
Spiller, Joel, Battersea
Statham, Thos. Henry, 77, York-place, Lambeth
Stephenson, Robert, M.P., 24, Great George-street, Westminster
Stevenson, Robert, Edinburgh
Stevenson, Allan, Edinburgh
Stevenson, D., 84, George-st., Edinburgh
Stirling, James, 11, Hill-st., Edinburgh
Storey, Thomas, St. Helen Auckland, Bishop Auckland, Durham
Strickland, William, Philadelphia
Struvè, Wm. Price, Swansea, S. Wales
Stuart, William, Plymouth
Suermondt, Yman Dirck C., Utrecht
Swanwick, F., Chesterfield
Swinburne, Wm., Westmr.-bridge Office
Taylor, John, jun., 2, Duke-street, Adelphi
Thomson, James, 9, Whitehall-place
Thomson, J. G., Worcester
Thornton, George, The Grange, Gargrove, Skipton, Yorkshire
Thorold, William, Norwich
Trubshaw, Jas. Heywood, Staffordshire
Turnbull, George, Woodberry Oaks, Stoke Newington
Valentine, J. S., King's Lynn
Vardon, R., Lansdowne-ho., Worcester
Vignoles, Charles, 4, Trafalgar-square
Walker, Jas., 23, Gt. George-st., Westmr.
Ward, J., Calcutta
Watson, Thomas Colclough, Grantham, Lincolnshire
Welch, Henry, Westgate-hill, Newcastle-on-Tyne
West, William, Tredenham-house, St. Blazey, Cornwall
Whishaw, Francis, 9, John-st., Adelphi
Whitworth, J., Manchester
Wicksteed, T., East London Water-works, Old Ford
Williams, E. L., Diglis House, Worcester
Wilson, Alex., Lieut.-Gen., Imperial Russian service, St. Petersburg
Wilson, Wm., St. James's-st., Sheffield
Winsor, Fred. A., 57, Lincoln's-inn-fields
Wood, Nich., Hetton-hall, Fence-house, Durham
Woodhouse, Thomas Jackson, Bath-st., Leamington
Woods, Edward, Liverpool and Manchester Railway, Liverpool
Wright, J., 11, Park-street, Westminster

Associates.

Abernethy, James, Aberdeen Harbour
Abernethy, George, Aberdeen
Adams, E., 11, Park-street
Adams, J., 11, Park-street, Westminster
Addison, J., Caledon. Rail. Office, Carlisle
Aitchison, George, 6, Muscovy-court
Armstrong, J., St. James's-sq., Bristol
Armstrong, William George, Elswick Iron-works, Newcastle
Atkinson, John S., Dawlish, Devon
Attwood, Matthias Wolverley, 27, Gracechurch-street
Ayrton, Fred., 3, Garden-court, Temple
Aytoun, R., Balgregy, Kirkaldy, N.B.
Bagnall, William, Gold's-hill Iron-works, West Bromwich
Bagnall, Thomas, Gold's-hill Iron-works, West Bromwich
Bagnall, James, Gold's-hill Iron-works, West Bromwich
Baker, Edward B., 10, St. Helen's-pl.
Baker, Geo., 13, Prince's-gate, Hyde-pk.
Bartlett, T., 32, Hanley-rd., Hornsey-rd.
Bartholomew, Charles, Rotherham
Baxendale, Joseph, Park-village West, Regent's-park
Bazalgette, J.V.N., 24, Great George-st.
Beanlands, A., Wakefield, Pontefract, and Goole Railway, Pontefract
Bennett, Samuel, Rotterdam
Belcher, Capt. Sir Edward, R.N., 22, Thurloe-square, Brompton
Berque, Charles Louis Aimé de, 9, Arthur-street West
Berkly, George, 24, Great George-street
Bethell, John, Parliament-street
Betts, Edward Ladd, 29, Tavistock-sq.
Biddell, George Arthur, Ipswich
Bingham, Henry Coles, Richardson's Hotel, Covent-garden
Birkbeck, George H., 10, Gloucester-rd.
Biven, Edward Jones, 22, Tavistock-place, Sunderland
Blake, H. Wollaston, 62, Portland-pl.
Blyth, Benjamin Hall, 26, Minto-street, Edinburgh
Bott, William Eagle, West House, Wortley, near Leeds
Boorer, J., 16, White Hart-street
Botfield, Beriah, 9, Stratton-street
Bradshaw, Geo., 27, Brown-st., Manch.
Braidwood, James, 68, Watling-street
Brayley, Edward Wedlake, London Institution, Finsbury-circus
Bremner, D., 16, Robertson-st., Glasgow
Brine, J. A., Town-hall, Birkenhead
Brown, W., Dock Office, Sunderland
Browne, Edward Fiske, Springfield, near Chelmsford
Browngar, W. G., 17, Park-street
Bruff, Peter, 34, Bloomsbury-street, Russell-square
Brunton, Thomas, Rue de Houssaie, No. 5, Paris
Buddicomb, William Barber, Rouen
Burt, H. P., 238, Blackfriars-road
Bury, T. T., 27, Golden-square
Butler, J. O., Kirkstall Forge, Leeds
Cammell, Charles, Cyclops Steel-works, Sheffield
Cantwell, Robt., 20, Gt. Marlborough-st.
Carnegie, William Fullarton Lindsay, Capt. R.A., Kimblethmont House, Arbroath, Forfarshire
Carr, Henry, Doncaster
Castle, Henry James, 7, Chancery-lane
Causton, A., Clarence-street, Gloucester
Cayley, Sir G., Bart., Brompton, Yorksh.
Cheffins, C. F., Southampton-buildings
Christy, Frederick Collier, Surrey-sq.
Chubb, John, St. Paul's Churchyard
Clacy, J. B., Reading, Berks
Clark, Thomas, 2, Finsbury-circus
Clutton, John, 8, Whitehall-place
Clutton, Henry, 26, Charles-street, St. James's
Coddington, Joshua William, Capt. R.E., Caledonian Railw. Office, Edinburgh
Coffey, Æneas, Bromley, Middlesex
Collinge, Arthur, Bridge-road, Lambeth
Collins, W. W., 10, Buckingham-street
Colquhoun, James Nisbet, Lieut.-Col. R.A., Athenæum Club, Pall-mall
Combe, J., 1, Ardmoulin-place, Belfast
Comrie, A., 15, Buckingham-st., Strand
Cottam, G., 2, Winsley-st., Oxford-st.
Coulthard, Wm., Bentham, Yorkshire
Cowen, Robert, Carlisle
Cowley, Joseph Glass
Crampton, T. R., 10, Buckingham-st.
Crane, P. Moir, Yniscedwyn Iron-works, Swansea
Croker, Bland William, 6, Hill-street
Croll, Alexander A., Suffolk-street
Cubitt, Thomas, 3, Lyall-st., Eaton-pl.
Cubitt, William, M.P., Gray's-inn-road
Cubitt, Lewis, 52, Bedford-square
Cundy, T., jun., 13, Chester-square
Currey, Henry, Lancaster-place, St and
Cursetjee, Ardaseer, Bombay
Curtis, C. Berwick, 74, Lombard-street
Curtis, John George Cockburn, 17, Fludyer-street
Curtis, T. A., Clarence Foundry, Liverp.
Dadian, Ohanes, Constantinople
Dawson, Robert Kearsley, Capt. R.E., 9, Somerset-place, Somerset House
Denison, Sir William Thomas, Major R.E., Gov. of Van Diemen's Land
Dent, Edward John, 82, Strand
Denton, J. Bayley, 9, Gray's-inn-square
Dickinson, John, Abbott's-Hill, Hemel Hempstead
Dobson, Edward, 8, Malvern-terrace, Islington

Dodds, I., 172, Buchanan-st., Glasgow
Dodson, Arthur J., Bangor
Donkin, Thomas, 7, Marlborough-place, Old Kent-road
Doull, A., 1, Morden-terrace, Greenwh.
Doyne, William Thomas, Railw. Office, Bath-street, Leamington
Drysdale, Alexander, 102, Constitution-hill, Birmingham
Dundas, J. F., 59, Castle-st., Edinburgh
Duncan, T., 40, Kensington, Liverpool
Dunkin, Robert, Llanelly, South Wales
English, Henry, 25, Fleet-street
Enys, J. Sam., Enys, Penryn, Cornwall
Evans, Frederick John, Brick-lane
Evans, George, Capt. R.N., Englefield-green, Surrey
Fairbairn, Thomas, Manchester
Ferrières, A. Du Bois de, 22, Fludyer-st.
Francis, Charles Larkin, South Lambeth
Francis, John, Town-hall, Manchester
Freeman, William, 27, Millbank-street
Frodsham, Charles, 84, Strand
Frome, Edward, Capt. R.E., Australia
Frost, Stephen, Newbridge, near Wolverhampton
Gastineau, John, Railway Station, Northampton
Gibbins, Thomas, The Brass Battery and Locomotive Tube-works, Birmingham
Gilbertson, William, Liverpool
Gladstone, T. M., Duke's Dock, Liverpl.
Goodwyn, Henry, Major B.E., Fort William, Calcutta
Gough, Nathan, Manchester
Gow, James, Malton, Yorkshire
Grant, Wm. Thomp., 4, Albert-terrace, Regent's park
Grantham, J., 5, Orange-court, Castle-street, Liverpool
Greener, William, Pilgrim-street, Newcastle-on-Tyne
Grissell, Thomas, 11, Palace-yard
Grissell, H., Regent's Canal Iron-works, City-road
Guest, Sir Josiah John, Bart., M.P., 8, Spring-gardens
Guppy, Thomas Richard, Bristol
Gutch, Geo., Bridge House, Harrow-rd.
Hall, James, Swansea
Hann, James, King's College
Hardy, T. G., Iron-works, Waterford
Harding, Wyndham, York-rd., Lambeth
Harness, H. Drury, Capt. R.E., Board of Trade, Whitehall
Harratt, C., 24, Liverpool-ter., Islingt.
Harris, G. W., 17, Park-street
Harrison, G., Canal Office, Lancaster
Hatcher, William Henry, Lothbury
Hawkins, Major Rohde, 7, Russell-sq.
Haywood, W., 10, Old Jewry-chambers
Heathcoat, John, M.P., 5, Warwick-street, Charing-cross
Hemming, S., Merrywood-hall, Bristol
Henderson, George, Lieut.-Col. R.E., Anglesea-place, Southampton
Henderson, Capt. A., 102, Gloucester-place, Portman-square
Henderson, P. E., Muir House, near Hamilton, Lanarkshire
Hennett, G., 23, Duke-street, Westmr.
Hensman, Charles L., 8, Orchard-place
Hensman, Henry, 5, Upper Chadwell-st.
Herbert, C., Major, Crinan Canal Office, N.B.
Highton, Edward, 5, Clarence-villas
Hjorth, Sören, 11, Winsor-terrace, Pimlico
Hocking, Samuel, 7, John-st., Adelphi
Hogg, Peter, Kensington Palace
Holland, Wm. Henry, Ipswich
Holtze, Chris. C. Gustave, Rotterdam
Homersham, S. C., 19, Buckingham-st.
Hoofe, J., Madeley-house, Kensington
Hooper, E., Manor-house, Alton
Horn, Joseph, Australia
Horne, James, Clapham-common
Houldsworth, J., Iron-works, Glasgow
Howard, T., Iron-works, Rotherhithe
Howell, J., 1, Vincent-square, Westmr.
Howkins, J., Granton, near Edinburgh
Hughes, Edward, Royal Hospital School, Greenwich
Hughes, John, 8, New-st., Spring-gardens
Hughes, Robert, Admiralty, Somerset House
Humfrey, J. H., Lieut.-Col., Manchester
Huntington, John Barker, Cam Hill-cottage, Wanstead, Essex
Hurwood, George, Ipswich
Ibbotson, D. J. H., Gainsborough
Illman, T., Old Quay Office, Manchester
Inman, W. S., Woods & Forests, Wthal.
Jackson, G. B. W., 11, Upper Woburn-place, Euston-square
James, Henry, Capt. R.E., Royal Dock-yard, Portsmouth
Jervis, Geo. Ritson, Col. B.E., Bombay
Johnson, W., Grosvenor-wharf, Westminster
Jones, John Edward, Liverpool
Joplin, Charles Michael, Broughton-in-Furness, Lancashire
Joseph, Joseph Aaron, 1, Adelaide-place, London-bridge
Kendall, H. E., 33, Brunswick-square
King, Nicholas, 7, King-st., Cheapside
Knight, S. J., Iron-works, Maidstone
Knight, William, Havannah
Labatt, H. R., Sydney
Lambert, William Blake, Royal Dock-yard, Portsmouth
Lane, Christopher Bagot, 58, New-street, Birmingham
Lane, Wm., 51, King-st., Westminster
Langdon, William, 18, London-street
Laws, John Milligen, Capt. R.N., Manchester
Leach, Stephen Wm., Turnham-green
Leather, J. F., Leventhorpe, near Leeds
Liddell, Andrew, Plean-house, near Stirling

Lindley, Robert Charles, 3, Great George-street
Lindsay, Henry Sell, Armagh
Llewellin, Wm., jun., Pontypool, Monmouthshire
Lloyd, Lt.-Col. John Augustus, Athenæum-club, Pall-mall
Lovelace, Rt. Hon. the Earl of, 10, Great Cumberland-street
Lushington, S., Capt. R.N., Bombay
Maingy, Robert Alexander, Canada
Manby, C., *Secretary*, 25, Gt. George-st.
Manby, Joseph Lane, Madrid
Marchant, Robert Mudge, Worcester
Margary, Peter John, Dawlish, Devon.
Marshall, Jas. Garth, M.P., Headingley-house, near Leeds
Marshall, W. P., New-st., Birmingham
Martin, Henry, 49, Leadenhall-street
Martin, Samuel Dickinson, 24, Great George-street
Maule, Geo. Benj., 18, Wilton-crescent
Maxwell, W. H., 8, Eccleston-st. South
May, Robert Charles, 4, Sloane-terrace
McCleod, Major-General B.E., 3, Clifton-place, Hyde-park
McConnell, James Edward, Wolverton
McIntosh, David, 39, Bloomsbury-sq.
Millar, W., Constantinople
Mills, George, Southampton
Mitchell, Thomas Telford, Perth
Mitchell, W., Central Station, Newcastle
Moody, Richard Clement, Capt. R.E., Junior United Service Club
Moody, S. B., 2A, Burton-st., Eaton-sq.
Moore, George, 64, Lincoln's-inn-fields
Morawski, Adalbert, Grand Duchy of Posen, Poland
Moreland, Richard, 25, Penton-street
Munday, James, Old Ford
Murphy, James, Park-street
Murray, J. E., 35, Craven-street, Strand
Mylne, W. C., jun., New River Head
Nasmyth, G., 18, Great George-street
Neate, Charles, jun., Great Grimsby, Lincolnshire
Newlands, J., Clare-terrace, Edgehill, Liverpool
Newton, William, 66, Chancery-lane
Nicholls, Nath., Bethlehem Hospital
Nixon, C., Railway Office, Cork
O'Brien, D., Capt. R.E., Gloucester-pl.
Oldfield, John Rawdon, Capt. B.E., India
Orkney, Right Hon. the Earl of, Taplow-court, near Maidenhead, Berks
Parkes, William, Alderney
Parsons, J. M., Raymond's-buildings
Parsons, William, St. Martin's, Leicester
Pearse, Ged., 105, Broad-st., Radcliffe
Pellatt, A., Holland-street, Blackfriars
Penrose, F. C., 4, Trafalgar-square
Pepper, J. H., Benfield-cott., Stockwell
Peppercorne, F. S., Sydney
Perkins, A. M., 6, Francis-st., Regt.-sq.
Perkins, E. Mosely, 67, Mark-lane, City
Peto, Sam. M., M.P., Great George-st.
Phillips, J., Sewers Office, Greek-street, Soho
Pickersgill, W. C., Tunnell Office, Dudley
Pim, James, Monkstown-castle, Dublin
Piper, T., jun., Grove-hill, Camberwell
Piper, William, 173, Bishopsgate-street
Pole, William, 29, Great George-street
Pollock, Fred., 35, Maddox-street, Regent-street
Pollock, G. K., 19, Essex-street, Strand
Porter, John Francis, Thames-bank
Price, Joseph Tregelles, Neath Abbey Iron-works, South Wales
Radford, W., Holyhead
Rankine, William John Macquorn, 5, North Charlotte-street, Edinburgh
Ransome, Robert, Ipswich
Ransome, James, Ipswich
Ransome, James Allen, Ipswich
Ransome, F., Flint-wharf, Ipswich
Ravenhill, Richard, Clapham-common
Rawlinson, Robert, Manchester
Reid, Wm., Lieut.-Col. R.E., Mill-hill, Woolwich
Renny, W. L., Royal Hospital, Dublin
Renton, Amherst Hawker, Pimlico
Richards, W., Tiverton, Devon
Rickman, William Charles, 21, Park-side
Riddell, C. J. B., Capt. R.A., 27, Alloa-street, Edinburgh
Rigaud, Rev. S. J., Little Dean's-yard, Weminster
Ritchie, Robert, 53, Castle-st., Edinbro'
Roberts, Julius, Lieut. Royal Marine Artillery, Portsmouth
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Robinson, Henry, Eaton-lodge, Pimlico
Robinson, Henry G., 6, Half-Moon-st.
Robinson, Henry Oliver, Millwall
Roe, John, Sewers Off., Hatton-garden
Roe, John P., Rhymney Iron-works, Abergavenny
Roney, Cusack Patrick, Hanover-gate, Regent's-park
Roosmalecocq, Andrew Henry, Ceylon
Ross, Owen, C.D., Little Bookham, Leatherhead, Surrey
Routledge, T., 6, Upper Stamford-st.
Sale, Thos. Henry, Capt. B.E., 28, Wellington-crescent, Ramsgate
Saunders, G. H., 20, Cowley-street
Sayce, W., Osborne-ho., Abergavenny
Schafhaeutl, Charles, M.D., Munich
Scott, John, Tennart-house, Greenock
Scott, M., Adelphi-chambers
Selby, G., Smethwick Grove, Birmingm.
Shaw, J. C., Queen-st.-wharf, Bristol
Shears, William, Lawn, South Lambeth
Simms, William, 136, Fleet-street
Simons, Gerritt, the Hague, Holland
Slate, A., Woodside Iron-works, Dudley
Smith, Sir Fredk., Maj.-Gen., Chatham
Smith, S. W., 24, Essex-street, Strand
Smith, John T., Major M.E., Madras
Smith, O. H., Distillery, Thames-bank

Smith, F. P., Admiralty, Somerset-ho.
Snow, Bernard, 4, North-street, Westmr.
Sorensen, Bergarius, Norway
Sowerby, William, jun., 52, Parliamt.-st.
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Greene, H. 43, Baker-st., Portman-sq.
Gregory, C. H. 1, Delahay-st., Westm.
Grenada, Agricultural and Horticultural Society of the Island of
Grenfell, C. P. 38, Belgrave-square
Grisbrook, W. Tenterden, Kent
Grove, C. 150, New Bond-street
Guise, J. 75, Margaret-street, Wilmington-square
Gunter, R. Lowndes-street; and Stanmore-hill, Middlesex
Gurdon, W. Hill-house, East Bergholt, Suffolk
Gwilt, G., F.S.A. 8, Union-st., Boro'
Howard, Right Hon. C. W. G. 56, Park-street, Grosvenor-square
Habberfield, R. 21, Eastcheap
Haddan, J. C. 29, Bloomsbury-square
Hagen, E. Dockhead
Hailstone, E. Horton-hall, Yorkshire
Hale, W. Orange-street, Southwark
Hale, W. S. 73, Queen-street, City
Hall, G. F. 15, Norfolk-street, Middlesex Hospital
Hall, J. Great George-street, Ratcliffe-highway
Hall, S. Athenæum Club
Hallowes, W. 32, Tavistock-square
Hamer, J. 158, High Holborn
Hamilton, O. 15, James-street, Buckingham-gate
Hammond, W., jun. 9, Queen-square, Bloomsbury
Hancock, J. L. Goswell-mews, Goswell-road
Hanhart, M. 64, Charlotte-st., Rathbone-place
Hardcastle, J. 22, Eastcheap
Harding, J. D., D.C.L. The College, Doctors'-commons
Harding, J. D. 3, Abercorn-place, Maida-hill, St. John's-wood
Harding, W. South-Western Railway Station, York-road, Lambeth
Hardisty, E. B. 43, Gt. Marlborough-st.
Hardwick, P., R.A. 60, Russell-square
Hardy, R. W. H., Lieut. R.N. Sion-hill, Bath
Harrison, G. 16, Carlton-house-terrace
Harrison, H. 1, Percy-street, Rathbone-place
Harrison, J. 3, Grosvenor-gate, Park-la.
Harrison, T. R. St. Martin's-lane
Harrison, R. 19, Friday-street, City
Hart, S., R.A. 16, Russell-place, Fitzroy-square

Harvey, J. K. 25, Ely-place, Holborn; and 18, Trigon-place, Clapham-road
Hatchard, Rev. T. G. Rectory, Havant
Hawes, B., jun. M.P. 9, Queen-square, Westminster
Hawes, W. 17, Montague-place, Russell-square
Hawkins, B. W. 57, Cambridge-street, Hyde-park-square
Hay, D. R. 90, George-st., Edinburgh
Hayward, J.P. 88, Newgate-street
Heberden, T., M.D. 11, Upper Brook-street, Grosvenor-square
Helbert, J. H. 60, Gloucester-place, Portman-square
Henderson, A. Gloucester-pl., Hyde-pk.
Hendrie R. 12, Tichbourne-street
Henson, H. H. Elm-cottage, East-lane, Pinner
Heseltine, S. Stock Exchange
Hetley, J. H. 35, Soho-square
Hewitt, D. P. 23, Great George-street
Hewitt, F. K. Old Hummums, Covent-garden
Hick, J. Bolton
Hickson, S. Highgate
Higgins, J., M.R.I. 6, Albert-terrace, Upper Holloway
Highton, E. Clarence-villa, Gloucester-road, Regent's-park
Hill, C. 23, Hyde-park-square
Hinde, H. P. Hall-staircase, Inner Temple
Hippisley, J., B.A. Stone-Easton, near Bath
Hislop, C. 20, Gutter-lane, City
Hoare, C., F.R.S., &c. 37, Fleet-street
Hoare, D. J.
Hoblyn, T., F.R.S. White Barns, near Buntingford, Herts
Hobson, G. H. 17, Cornhill
Hodge, P. K. 140, Strand; and Albion-grove, Barnsbury-park
Hoffstaedt, A. V. Bridge-st., Blackfriars
Holford, J. Holford-ho., Regent's-pk.
Holland, J. Ranelagh Works, Belgrave-square
Holland, W. 19, Marylebone-street
Hollier, R., F.S.A., &c. 12, Great Winchester-street; and Greenwich
Hollins, M. D. Stoke-upon-Trent
Holmes, J. 4, New Ormond-street
Holtzapffel, Mrs. Long-acre
Hope, H. T., M.P. 116, Piccadilly
Horne, H. 26, Montague-square
Horton, J. 28, Devonshire-st., Queen-square
Horsfall, H. Vauxhall Foundry, Liverp.
Howard, D. 6, Torrington-place, Torrington-square
Howe, G. 119, Guildford-st., Borough
Hoy, H. B. 14, Pancras-vale
Hubert, S. M. West-hill, Wandsworth
Hughes, J. Albert-road, Sydenham
Hughes, W. H., F.S.A. 12, King's-bench-walk, Temple
Hunt, J. 31, Parliament-street
Humby, G. Carlton-chambers, Regent-street
Hume, J., M.P. 6, Bryanston-square
Hutchinson, W. East Temple-chambers
Ilchester, Earl of. 31, Burlington-st.
Ibbetson, Capt. B. Clifton-ho., Brompton
Ivory, T. 4, Old-square, Lincoln's-inn
Jackson, A. R., M.D. Warley, near Brentwood, Essex
Jackson, Rev. W. Pitsford, near Northampton
Jeanes, J. 67, New Bond-street
Jee, A. S. 6, John-street, Adelphi
Jenkins, C. 4, Horner-street, Lambeth
Jennens, T. H., jun. Birmingham
Jennings, G. 29, Great Charlotte-street, Blackfriars-road
Jennings, J. R. Wanstead, Essex
Jenour, J. 3, Eden-place, Gravesend
Jobson, J. Holly-hall, Dudley
Jobson, J. Sheffield
Johnson, A. 7, Gresham-street West
Johnson, H. 39, Crutched-friars, City
Johnson, W. Millbank-row, Westminst.
Johnstone, J. Willow-park, Greenock
Jones, R. L. Highbury
Jones, J. 338, Strand
Jones, O. 9, Argyle-place, Regent-st.
Jordan, T. B. Belvedere-rd., Lambeth
Judkins, E. Beaufort-buildings, Strand
Jutsum, H. 174, Edgeware-road
Keith, G. 11, Princes-st., Leicester-sq.
Kelsey, R. 73, Chiswell-street
Kemble, H. Chester-place, Hyde-park
Kemp, G. T. 35, Spital-square
Kendall, H. E. 17, Suffolk-street, Pall-mall East
Kerr, Mrs. 67, Grosvenor-square
Kingsford, C. 37, Crutched-friars
Kingsford, E. London and Westminster Bank, Southwark Branch
Knight, C. 90, Fleet-street
Lansdowne, Marquis of (V.P.), F.R.S., &c. 54, Berkeley-square
Lonsdale, Earl of, F.R.S., &c. 15, Carlton-terrace
Laing, D. G. 2, Villiers-street, Strand
Lancaster, C. W. 151, New Bond-st.
Langdon, A. 28, Great Russell-street, Bloomsbury
Langley, J. C. Gloucester-pl., Greenwich
Lapworth, A. 19, Old Bond-street
Laurence, F. 36, Tavistock-street
Laurie, J. 1, Hyde-park-place
Law, T. 30, St. Swithin's-lane
Lawes, Capt. R.N. Sussex-sq., Hyde-pk.
Lawson, H. 7, Lansdowne-cres., Bath
Laxton, W. 10, Fludyer-st., Westminster
Leach, G. 16, Marlborough-place, St. John's-wood
Leaf, W. 39, Old-change
Le Couteur, Col. Island of Jersey
Lee, C. 20, Golden-square
Lee, J. F., LL.D. Doctors'-commons
Lee, S. H. Dalston

Leeks, E. F. 21, Queen's-road, Gloucester-gate, Regent's-park
Lefevre, J. S. House of Lords
Le Mann, F. 15, Threadneedle-street
Leon, J. A. Kenwood-cottage, Norwood
Levey, G. Great New-st., Fetter-lane
Levien, S. New South Wales
Lewis, S., jun. 195, Regent-street; and Roehampton
Lewis, T.
Lindley, N. Acton-green, Turnham-green
Lindley, W., C.E. 8, Royal-ter., Adelphi
Lister, W. 15, Manchester-buildings, Westminster
Little, G. 3, Furnival's-inn
Lloyd, D. 19, Friday-street, City
Lloyd, Lieut.-Col. J. A., F.R.S. Athenæum Club
Lobb, W., M.D. 12, Aldersgate-street
Locke, J., M.P. 11, Adam-st., Adelphi; and 6, Chester-terrace, Regent's-park
Lockett, J. Fennell-street, Manchester
Long, W. Preshaw-house, near Bishops' Walton, Hants
Lott, T. 43, Bow-lane, Cheapside
Low, R. 330, Strand
Lowe, G., F.R.S. 39, Finsbury-circus
Lowry, J. W. 45, Robert-street, Hampstead-road
Loyd, S. J. 22, Norfolk-st., Park-lane
Lund, H. Hare-court, Temple
Manvers, Earl. 13, Portman-square
M'Adam, Sir J. 22, Whitehall-place
M'Dougall, A. 44, Parliament-st., West.
Macgrigor, W. F. Vauxhall Foundry, Liverpool
Mackerness, T. 37, West-sq., Southwark
Maclise, D., R.A. 14, Russell-place, Fitzroy-square
Macpherson, R. 76, Lombard-street
Magrath, E. Athenæum, Pall-mall
Mair, G. 18, Charlotte-st., Bedford-sq.
Margetson, J. 17, Cheapside
Marriott, J. Dewsbury, Yorkshire
Marshall, E. S. 31, John-street, Tottenham-court-road
Martin, S. D. Flower-bank, Burley, near Leeds
Martineau, W. H.
Masters, T. 294, Regent-street
Matthews, W. 367, Strand
Maudslay, T., C.E. Cheltenham-place, Westminster-road
Maw, S. 31, Aldersgate-street
Mawley, H. 20, Gower-street
May, C. Ipswich, Suffolk
Mercer, C. Ashford, Kent
M'Ewen, R. H.M.S. Amphion
M'Clean, J. R. 17, Great George-street, Westminster
M'Glashan, A. 16, Long-acre
Medley, F. 59, Glo'ster-road, Hyde-park-gardens
Meeking, C. Streatham; and Holborn-hill
Meinertzhagen, D. 10, Moorgate-street
Merle, W. H. 24, Lansdowne-place, Cheltenham
Messenger, S. Birmingham
Meyer, C. P. Enfield
Middleton, J. St. Stephen's, Norwich
Miles, C. 96, Great Russell-street
Miller, T. E. 1, Alfred-pl., Bedford-sq.
Minton, H. Stoke-upon-Trent
Moffatt, G., M.P. 85, Eaton-square
Moore, G., F.R.S. 64, Lincoln's-inn-fields
Moore, J. 45, Goswell-road
Morgan, J. 27, Hoxton-square
Morgan, O., M.P., F.R.S. 9, Pall-mall
Morrell, G. F. 149, Fleet-street
Morrison, J., M.P. 57, Upper Harley-st.
Morson, T. N. R. Southampton-row, Russell-square
Morton, F. Walton-on-the-Hill; and North John-street, Liverpool
Mortimer, J. Hanover-square
Mortlock, J. 250, Oxford-street
Mortlock, W. 18, Regent-street
Morton, J. C. Whitfield, Berkeley, Gloucester
Mott, I. H. R., D.M., M.D. 76, Strand; and 48, Norland-square, Notting-hill
Moulton, S. 32, Chester-street, Grosvenor-place
Mudge, Col. R. E. Buckwood, Plympton, Devon
Mulready, W., R.A. 1, Linden-grove, Kensington
Munday, G. 26½, Abchurch-lane, City
Munday, J. 26½, Abchurch-lane, City
Murchison, J. H. 10, Holles-street, Cavendish-square
Murdoch, R. 1, Upper Vernon-street, Lloyd-square
Murrey, A., jun. 35, Craven-st., Strand
Musgrave, T. 6, Gordon-square
Northumberland, Duke of, F.R.S., Northumberland-house, Charing-cross; and Alnwick-castle, Northumb.
Norfolk, Duke of, K.G., Norfolk-house, St. James's-square; and Arundel-castle, Sussex
Northampton, Marquis of (V.P.), F.R.S. Piccadilly; and Castle Ashby, Northamptonshire
Northesk, Earl of. Winchester, Hants
Nasmyth, G. 18, Great George-street, Westminster
Neeld, J., M.P. 6, Grosvenor-square
Newall, R. S. Gateshead
Newington, S., M.D. Knole Frant, near Tunbridge-wells
Newton, W. 66, Chancery-lane
Newton, W. E. 66, Chancery-lane
Nicoll, D. B 2, Albany, Piccadilly; and Old-fields, Acton, Middlesex
Normanville, W. G. Glynn-cottage, Park-village East, Regent's-park
Nurse, W. M. St. Alban's-lodge, Dyke-road, Brighton

Orkney, Earl of. Taplow-court, near Maidenhead
Olive, J. 4, York-terrace, Regent's-pk.
Osborne, S., jun., F.L.S. 4, Stockwell-park, Brixton
Oxenford, J. 16, John-st., Bedford-row
Portland, Duke of, F.R.S. Harcourt-house, Cavendish-square
Phipps, Col. Hon., C.B. Windsor-castle
Page, T. 3, Eccleston-square
Palmer, P. 118, St. Martin's-lane
Palmer, W. H. 24, Bedford-row
Parry, T. 38, Bloomfield-road
Parry, T. G. Higham-court, Gloucester
Paxton, A. F. 10, Buckingham-st.,Strand
Payne, E. J. 2, Bennett's-hill, Birming.
Payne, J. Inner Temple-lane, Temple
Payne, W. New Bond-street
Paynter, J. 64, Coleman-street
Pellatt, A. Holland-street, Blackfriars
Pennethorne, J. 7, Whitehall-yard
Pepys, J. 8, Lower Berkeley-street
Pepys, W. H., F.R.S. 11, Earl's-terrace, Kensington
Percival, R., F.S.A. 76, Lombard-st.
Perkins, A. M. Francis-street, Gray's-inn-road
Perry, G. 39, Spencer-street, Northampton-square
Perry, R. W. 6, Sussex-ter., Hyde-pk.
Peto, S. M., M.P. Russell-square
Phillips, H. 24, Long-acre
Phillips, H. Wyndham; and 8, George-street, Hanover-square
Phillips, W. P. 359, Oxford-street
Picciotto, M. H. 3, Dean-street, Finsbury-square
Pierce, W. 5, Jermyn-street
Pihl, O. 49, Hollywell-street, Vincent-square, Westminster
Pilgrim, C. H. Bear-place, near Maidenhead
Platow, W. 55, High Holborn
Platt, J. 22, Park-square East, Regent's-park
Pledge, E. V. 311, Cheapside, Birming.
Plomley, F., M.D. Maidstone
Plomley, J. F. Rye, Sussex
Pole, W., F.R.S. 18, Old-square, Lincoln's-inn
Powell, N. Glass-works, Whitefriars
Powell, A. Ditto
Powles, J. D. 6, York-pl., Portman-sq.
Prevost, J. L., Consul of the Swiss Confederation. Gresham-street, City
Prideaux, F. S. Southampton
Prinsep, W. H. 30, Gloucester-gardens, Westbourne-terrace
Prior, E. 48, York-terrace, Regent's-pk.
Proctor, J. 18, Cheapside
Prosser, R. 1, Cherry-st., Birmingham
Provis, W. A., C.E. The Grange, near Ellesmere, Salop
Pryor, W. S. 23, Broad-st.-build., City
Russia, His Imperial Majesty the Emperor of
Radnor, Earl of (V.P.), F.R.S. 52, Lower Grosvenor-street
Romney, Earl of (V.P.), F.R.S. Murdstone
Radcliff, Sir J., Bart. Rudding-park, Wetherby, Yorkshire
Rennie, Sir J., F.R.S. Whitehall-place
Rothschild, Sir A., Bart. Grosvenor-house, Grosvenor-place; and New-court, St. Swithin's-lane
Ross, Sir W. C., R.A. 38, Fitzroy-sq.
Ramsden, R. 7, Brook-street, Holborn
Randell, G. 41, Burton-crescent
Rastrick, J. U., C.E. 51, Eaton-square
Rea, E. 115, Wardour-street
Redgrave, R., A.R.A. Hyde-park-gate South, Kensington-gore
Redgrave, S. Hyde-park-gate South, Kensington-gore
Reeves, J., F.R.S. and F.L.S. Clapham
Reeves, J. R., F.R.S. and F.L.S. King's-arms-yard, Coleman-street
Reid, W. 25, University-street, Tottenham-court-road
Rendel, J. M., C.E. 8, Great George-street, Westminster
Reveley, G. J. 17, Queen-sq., Bloomsb.
Reveley, H. W. Sunny-hill, Parkston, Poole, Dorset
Reveley, W. A. 17, Queen-sq., Bloomsb.
Reynolds, T. 45, Devonshire-street, Portland-place
Ricardo, J. L., M. R. (V.P.). 31, Lowndes-square
Ricardo, M. Brighton; and 2, King-street, St. James's-square
Rich, C. Palace-row, New-road
Richardson, B. Wordsley Works, Stourbridge
Richardson, J. Ditto
Richardson, W. 7, St. George's-terrace, New Kensington
Roberts, D., R.A. 7, Fitzroy-street
Robinson, J. 7, Gower-st., Bedford-sq.
Robinson, J. Berkhampstead
Rock, J., jun. 6, Stratford-pl., Hastings
Rofe, J. Winkley-square, Preston
Roget, P. M., M.D. 18, Up. Bedford-pl.
Romilly, E. 14, Stratton-street
Rose, W. Newcastle-street, Strand; and Coalport, Shropshire
Ross, A. 2, Featherstone-bdgs., Holborn
Rotch, B. (V.P.). 1, Furnival's-inn, Holborn
Roughton, L. 28, York-place, City-rd.
Rouse, R. Grove-lane, Camberwell
Rowe, J. B. Brentford
Rundell, W. W. Polytechnic Society, Falmouth
Rush, G. Elsingham-hall, Bishops' Stortford
Russell, H. H. 2, Derby-street, Parliament-street
Russell, J. J. 81, Upper Ground-street, Blackfriars
Russell, T. H. Ditto

Rutter, J. O. N. Black-rock, Brighton
Sutherland, Duke of (V.P.), K.G., Stafford-house
Stanhope, Earl, 20, Charles-street, Berkeley-square
Smart, Sir G. 91, Great Portland-street
Salomons, A. 22, Cambridge-street, Hyde-park
Salomons, D., Alderman of the City of London. Shorter's-court
Samuelson, M. Post-office, Banbury
Saunders, J. E. 16, Finsbury-square
Saunders, J. E., jun. 3, Terrace, Kennington-common
Saunders, T. Hammersmith
Saunders, T. W. 6, Charing-cross
Saunders, W. W. East-hill, Wandsworth
Saward, M. 9, Chatham-pl., Blackfriars
Schneider, R. Naseby-lodge, Welford, Northamptonshire
Scholey, W. Stockwell-common
Scholfield, W. F. Leeds
Scott, H. E. 14, Gray's-inn-square
Scott, J. A. 13, Pall-mall East
Scott, H. D. 10, Eccleston-st., Pimlico
Scrivener, R. Alpurton Tile-works, Acton, Middlesex
Sex, E. Stock Exchange
Seymour, W. Brighton
Sharpe, E. 2, Devonshire-terrace, Marylebone
Shears, D. T. Bankside
Shephard, C., jun. 53, Leadenhall-st.
Sheppard, R. Newport Pagnell
Sheriff, G. W. Streatham-hill; and 61, Friday-street
Shore, O. Upper Clapton
Shuter, T. A. Hooley-house, Colsden, Surrey
Sich, H. Chiswick
Siemens, W. Summerfield-cottage, Birmingham-heath, Birmingham
Silverlock, H. 3, Wardrobe-terrace, Doctors'-commons
Simpson, J., C.E. 29, Great George-street, Westminster
Simpson, W. B. 456, Strand
Skeat, W. 6, Park-place-villas, Maida-hill West
Smirke, E. 3, King's-bench-wlk., Temple
Smirke, S. 24, Berkeley-square
Smith, B. Staunton-hall, near Derby
Smith, C. H. 39, Clipstone-street
Smith, G. Frederick's-place, Old Jewry
Smith, G. Cornhill
Smith, G. 29, Finsbury-square
Smith, H., C.E. 25, Parliament-st., West.
Smith, J. 45, Jermyn-street
Smith, J. S. Whitechapel Distillery
Smith, J. 49, Long-acre
Smith, J. J. Roscoe-place, Sheffield
Smith, R. P. Avenue de St. Cloud 29, Paris
Smith, W. 69, Princes-st., Leicester-sq.
Smith, W. H. 10, Norfolk-st., Strand
Smithies, T. B. Gutta Percha Company, City-road
Solly, E. 33, Bedford-pl., Russell-sq.
Solly, H. Tipton, near Birmingham
Solly, J. Tipton, near Birmingham
Solly, R. H., F.R.S. 48, Gt. Ormond-st.
Solly, W. H. Surge-hill, near King's Langley, Herts
Sopwith, T. Chapel-pl., Duke-st., West.
Speer, E. Treasury
Spence, W. 50, Chancery-lane
Spiers, R. J. Oxford
Standige, W. 36, Old Jewry
Stapylton, M. Myton-hall, Boroughbridge
Staunton, M. 9, Strand
Staunton, W. S. 9, Strand
Stephenson, R., M.P. (V.P.), C.E. 24, Great George-street, Westminster
Storey, W. J. C. 12, Marlborough-place, St. John's-wood
Strutt, E. 43, South-st., Grosvenor-sq.
Strang, Dr. The Town-hall, Glasgow
Sutton, R. Royal Exchange
Symonds, A. 6, Adelphi-terrace
Taber, J. Herne-hill
Talbot, T. M. Penric-castle, Glamorganshire
Tanqueray, C. Vine-st., Bloomsbury
Taylor, J., jun. Queen-st.-pl., Southw.
Taylor, J. 11, St. George's-place, Knightsbridge
Taylor, J., jun. 22, Parliament-street
Tebbitt, W. Cottage-house, Clapham-common
Tebery, J. 41, Gracechurch-st., City
Tennant, J. 149, Strand
Tenniel, J. B. 30, Blandford-square
Terni, V. 3, Crown-court
Thackeray, W. M. 18, Young-street, Kensington
Thom, J. Manchester
Thomas, J. Richmond-villa, Park-place, Paddington
Thomson, A. 25, New Bond-street
Thompson, J. 1, Camden-hill-terrace, Kensington
Thompson, R. G. Kirby-hall, near Boroughbridge
Thorne, J. M., jun. Turret-house, South Lambeth
Thornton, J., C.E., F.G.S. The Grange, Gargrave, Skipton, Yorkshire
Thornton, J., jun. Ditto
Thorold, W. Norwich
Thurston, J. Catherine-street, Strand
Thurston, S. 9, Southampton-street, Bloomsbury
Tite, W., F.R.S. Lowndes-square
Todd, J. R. 11, John-street, Adelphi
Todd, W. R. Trueby-house, Woodford
Tomason, G. 60, Shaftesbury-street, New-north-road
Topham, C. 157, Whitecross-street
Topham, T. Ripley, near Alfreton, Derby
Tuck, J. H. 2, St. James's-square

Tulloch, J., F.R.S., &c. 16, Montague-place, Russell-square
Turner, T. Streatham-hill
Twining, H. Grove-house, Clapham-common
Twining, R., F.R.S. 13, Bedford-place, Russell-square
Twining, T., jun. Perryn-house, Twickenham
Underwood, J. 25, Eastcheap
Uwins, T. (V.P.), R.A. Victoria-road, Kensington
Urling, G. F. 224, Regent-street
Van Voorst, J. Paternoster-row
Varley, C. 1, Charles-st., Clarendon-sq.
Varnish, E. Hyde-park-gate-villas, South Kensington
Varty, T. 31, Strand
Vaughan, G. 28, Cumberland-terrace, Regent's-park
Vaughan, P. 70, Fenchurch-street
Veitch, J., M.D. 6, Ovington-square, Brompton
Vint, H. St. Mary's lodge, Colchester; and 14, Berners-street
Vivian, B. T. T. Crownan, Cornwall
Vulliamy, B. L., F.R.A.S. 68, Pall-mall
Willougby de Broke, Lord. 21, Hill-street, Berkeley-square
Waite, H. Church-st., Stoke Newington
Wakefield, J. C. 20, Friday-street, City
Waley, S. W. 22, Devonshire-place
Walker, J. (V.P.), F.R.S. 23, Great George-street, Westminster
Wall, A. 1, India-row, East-India-road
Waller, E. 49, Fleet-street
Walters, D. 14, Wilson-street, Finsbury
Ward, W. A 3, Albany, Piccadilly
Warner, A. Jewin-crescent
Warren, A. Grove, Kentish-town
Warriner, H. Engineers'-office, Railway Station, Coventry
Wass, C. W. 8, Adam-street, Adelphi
Waterhouse, A. 1, St.Paul's-churchyard
Watson, J. W. Latymore-lodge, Hammersmith
Watts, F. 1, Warwick-squ., Belgrave-rd.
Wetherby, J. 6, Old Burlington-street
Webb, C. L. 14, Burton-crescent
Webb, E. B. Castle Leeky, Newtown, Limavady, Derry
Webb, J. 5, Old Bond-street
Webster, T., M.A. (V.P.). 2, Pump-court, Temple
Webster, T., R.A. The Mall, Kensington
Webster, W. B. 48, Charing-cross
Weedon, T. 41, Hart-st., Bloomsbury
Westall, R. 115, Lower Thames-street
Westley, W. 24, Regent-street
Whatman, J., M.A.S. Vinters, Maidstone
Whishaw, H. 3, Gray's-inn-square
Whishaw, F. 9, John-street, Adelphi
White, G. F. Millbank-street
Whitworth, J. Manchester
Whittingham, C. Chiswick
Wigg, F. 7, Bedford-row
Wigg, G. 61, Westbourne-ter., Hyde-pk.
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Wilks, J. Watling-street
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Wilson, L. P. 11, King's-arms-yard, Moorgate-street
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ROYAL CORNWALL POLYTECHNIC SOCIETY.

THIS Society was founded in the year 1833, and has the honourable distinction of having been the first of its kind in this kingdom, and of having led to the institution of several of a similar name and character in different parts of England. It originated in a suggestion from Miss Fox, daughter of Mr. R. Were Fox, of Falmouth, that an exhibition of specimens of the Fine and Industrial Arts should be held in that town, at which prizes should be given, "to stimulate the ingenuity of the young, to promote industrious habits among the working classes, and to elicit the inventive powers of the community at large." The idea was warmly seconded by the principal inhabitants of the neighbourhood, and the Society was speedily inaugurated as a county institution, under the patronage of Lord de Dunstanville, and the presidency of Sir C. Lemon, Bart., M.P., with some of the leading men of Cornwall for its officers.

It may be expected that, in a part of the kingdom which has for so long a period been remarkable for the mechanical skill displayed in its mining operations, the attention of the Society would be soon directed to this department; and we find, at its first annual meeting, that premiums were offered by Charles Fox, Esq., of ten guineas, five guineas, and three guineas, for the best improvements on the methods of ascending and descending in mines; and a premium of 10*l.* by Sir C. Lemon and Robert Were Fox, Esq., for the best series of experiments tending to prove how the dangers attendant upon blasting rocks may be most effectually and economically guarded against. In succeeding years similar premiums,and others having relation to the different interests of the county, were offered by the Society and its members; and the number of ingenious inventions and interesting papers which were received in competition for them, showed at once the success and great utility of the Society.

In 1835, on the death of the first patron, H. M. William IV. consented to hold this office; the celebrated Davies Gilbert, president of the Royal Society, having previously accepted the office of vice-patron, and taking also an active part in the proceedings at the annual exhibitions of the Society.

In the Annual Report for 1835 appeared a paper on the diseases of miners, by Dr. Carlyon, and two on the Pilchard fishery; one of these

was by the accomplished ichthyologist, Jonathan Couch, Esq., F.R.S. Other papers on the diseases of miners followed, and tended to strengthen the feeling of the importance of relieving this industrious class of men from the fatigue of climbing from great depths. Premiums were repeatedly offered and awarded for perfecting the models of machinery intended for this purpose, which had been submitted to the judges at the exhibitions; and eventually several of the members offered, through the medium of the Society, a premium of 500*l*. to the mine adventurers who should first introduce the man-machine invented by Mr. Michael Loam; and a further premium of 50*l*. was offered by the Rev. Canon Rogers to the engineer who should erect the same to the satisfaction of the judges. The first premium was awarded in 1843 to the adventurers in Tresavean mine, and the smaller premium to the inventor of the machine for putting it to work in a satisfactory manner. This machine has been carried to a depth of about 300 fathoms. Another premium was then offered, of 103*l*., to the mine which should introduce the second man-machine. This was awarded in 1845 to the adventurers in the United Mines, who have introduced the machine to the depth of more than 200 fathoms. Premiums for further improvements in these machines, and also for the best essay on the vital and economical effects resulting from their introduction, are still offered by the Polytechnic Society.

The great importance of this machine, both to the miner and the adventurer, may be easily shown. It has been calculated that a miner, in descending to his work at the bottom of Tresavean mine, and again climbing to the surface by ladders, expends one-fifth of the time, and exhausts a much larger proportion of the force he is able to expend in daily labour. If a miner weighs 150 lbs., and ascends the 280 fathoms in one hour, he exerts a force equal to raising 4,200 lbs. a foot high in a minute, or rather more than one-eighth of the estimated power of a horse, an expenditure of strength which must have a very injurious effect on the health of a man who has been working for some hours in the moist, dense, and hot atmosphere of a mine. In fact, only the youngest and strongest miners are able to work in the deep levels and afterwards climb to the surface. The late Captain W. Francis considered that the whole of the miners at the United Mines worked at the average depth of 200 fathoms, and that the time actually saved by the machine is about half an hour per man and boy for each descent and ascent, and is worth to the mine fully 800*l*. per year. This is probably not one-third of the real gain which has been effected by the introduction of the man-machine in this mine; a similar remark will also apply to Tresavean; and when it is considered what a relief it must be to the poor miner who has been working at his laborious occupation at a temperature varying from 70° to 90° Fahrenheit, to be raised to the surface without the great and wasting exertion which has been mentioned,—an exertion which tends so much to produce and aggravate those pulmonary complaints so common and so fatal to the mining population,—the advantages which have resulted from the invention and introduction of this machine must be very apparent.

If this were the only good which had originated in the Polytechnic Society, it would well deserve the support which it receives; but the number of ingenious inventions and improvements which are brought every year to its exhibitions, and a large portion of which relate to mining machinery and operations, shows that to the mining interest it must be particularly

useful. This will be more apparent when it is considered that nearly one-half of the papers in its Annual Reports relate to subjects of importance to the miner, as will be seen by the following brief synopsis of the contents of its first seventeen Annual Reports:—

Papers relating to mechanical inventions and improvements connected with mining operations	38
Papers relating to health of miners and mining statistics ..	13
,, the man-machine	8
,, steam and the steam-engine	10
,, other mining subjects	12
,, fisheries and agriculture of Cornwall ..	9
,, natural history of Cornwall	20
,, statistics of Cornwall	8
,, scientific and mechanical subjects not included in the above	67

For obvious reasons, our notice of this Society has been confined to its relations to mines and mining; but it is by no means ineffective in its other departments. In fact it has been in accordance with its name, *Polytechnic*. The fine arts appear to have always been a favourite section; and among several artists whose early productions were introduced to public notice by its exhibition, and whose talents were fostered and stimulated by its rewards, are Mr. Silas Rice, now at the head of one of the Government schools of design, and Mr. N. N. Burnard, the sculptor. Of upwards of 2,300*l*., exclusive of medals, which have been awarded as premiums and prizes by this Society, more than 800*l*. have been given in the fine art department.

Besides the sections which have been named are others for naval architecture, statistics, natural history, school productions, and fancy-work. The school department is invariably a very interesting portion of the annual exhibition.

The success which has attended this Society from its commencement is undoubtedly owing, in a great degree, to the fostering care of Sir C. Lemon, the Messrs. Fox, Mr. Enys, the Messrs. Taylor, and other gentlemen who have taken part in its management, and assisted as judges at the annual exhibitions; but it must be manifest that, unless both mechanical and artistic skill existed in the county, and was really stimulated, encouraged, and developed by this institution, it would not, after a lapse of seventeen years, still take rank among the first of the provincial institutions of this kingdom, whether it be estimated by its reputation, the number of its subscribers, or the amount of its income.

The number of subscribers, at present, is about 350, and the income of the Society 400*l*. per annum; and it is worthy of remark that the rate of subscription is so low as not to exclude the practical mechanic, being only 5*s*. per year. The average amount subscribed is about 10*s*. per year, but many of its members give 2*l*. 2*s*. annually. Each subscription gives a proportionate number of tickets of admission to the annual exhibition. Some of the mines of the county also make annual donations to its funds, but not so many as might be expected from the character and objects of the Society.

It must not be omitted that her most gracious Majesty has been patroness of the institution for many years, and that his R. H. Prince Albert is vice-patron.

GLOSSARY OF TERMS

USED IN THE MINING DISTRICTS OF DEVON, CORNWALL, DERBYSHIRE, STAFFORDSHIRE, NORTHUMBERLAND, DURHAM, ETC., WITH THOSE EMPLOYED IN THE FOREIGN MINES.

To which are added,

SMELTING TERMS, AND THOSE ASSOCIATED WITH THE SCIENCES OF GEOLOGY, MINERALOGY, AND METALLURGY.

CORNWALL AND DEVON.

Acicular—From acicula, a needle, signifying long slender crystals.

Adit level—An horizontal excavation, whereby the water from above that level, and drawn from the bottoms of the mine, is conveyed.

Adventurers—Those who have shares in a mine. According to Pryce, in his *Mineralogia Cornubiensis*, *In*-adventurers are shareholders who attend to the working, and supply goods; *Out*-adventurers are those who pay their *quota* without attending to the management or benefit by supplying materials.*

Aggregated—Where the component parts adhere, and may be easily separated; also when crystals are closely connected, they are said to be aggregated.

Air-machine—An apparatus for forcing fresh air into, or withdrawing foul air from, badly-ventilated places.

Air-pipes—Tubes or pipes of iron or wood for ventilating underground, or for the conveyance of fresh air into levels having but one communication with the atmosphere, and, consequently, no current of air existing.

Aitch-piece—That part of a plunger lift in which the clacks are fixed.

Alliaceous—The garlic odour of arsenical minerals when heated or struck.

Amorphous—Without any determinate form.

Anhydrous—Without water of crystallization.

Arch—A piece of ground left unworked.

Arched—The roads in a mine, built with stone or brick.

Argillaceous—Consisting of clay.

Arborescent or Dendritic—Ramifying like a tree.

Arseniate—The arsenic acid united with a base, as copper in the arseniate of copper.

Attle—Rubbish, refuse of the mine, containing little or no ore.

Average produce—The quantity of fine copper contained in the several parcels of ore raised from a mine, or sold at "ticketing."

Average standard—The average standard, or rate, at which a parcel of ores, at ticketing or otherwise, is sold. See *Standard*.

Axis of a crystal—The lateral planes surround its axis, which is an imaginary line passing down the middle of the prism from the centre of the upper to that of the lower terminal plane.

* This is not the case at the present moment, *In* and *Out*-adventurers being alike interested.

Back—The back of a lode, or that part nearest the surface from the point of working. That of a level is the part of the lode above.

Bal—The miner's term for a mine.

Batch of ores—Certain quantity of ore sent to the surface by any *pare* of men.

Bar of ground—A vein of a different description of rock, crossing the lode or "country."

Base—The substance to which an acid is united; the bottom or lower part.

Bearers—Supports to the pumps in the engine-shaft.

Beat away—To excavate, a term usually applied to hard ground.

Bed—A seam, or horizontal vein of ore.

Bend—Indurated clay; a name given by miners to any indurated argillaceous substance.

Bit—The steeled end of a borer.

Black jack—Blende.

Blende, also called Willd—One of the ores of zinc, composed of iron, zinc, sulphur, silex, and water; on being scratched it emits a phosphoric light.

Black tin—Tin ore previous to smelting, as obtained from the mine.

Blast holes—The holes through which the water enters the "windbore," or bottom of a pump.

Block tin—Metallic tin.

Blast—The air introduced into a furnace.

Blasting—Forcing off portions of rock by means of gunpowder. A hole is made with a borer, into which gunpowder is inserted, then tamped or confined, and ignited.

Blower—A smelter.

Bounds—The proprietary of tin ore over a given tract.

Bob—The engine beam.

Bowlders—Large stones or pebbles.

Botryoidal—Globular forms, such as are found in copper, &c.

Borer—A boring instrument, with a piece of steel at the end, called a boring bit.

Brace—The platform placed *over* the mouth of a shaft, or winze, to which the tackle is fixed.

Branch—A small vein which strikes out from the lode, and very generally again unites therewith.

Brood—Impurities mixed with the ores.

Broil or Bryle—The traces of the presence of a lode, found in the loose matter, at or near the surface.

Buckers—Bruisers of the ore.

Bucket—The piston of the lifting-pump.

Bucket-lift—A set of iron pipes attached to a lifting-pump.

Bucket-rods—Wood rods, to which the piston of the lifting-pump is attached.

Bucking-iron—The iron or tool with which the ore is pulverized or broken down.

Bucking-plate—An iron plate on which the ore is placed for being bucked.

Buddling—Separating the ores from the earthy substance by means of an inclined hutch or cistern.

Bunch, or Squat of ore—A quantity of ore of small extent; more than a stone, and not so much as a course.

Burden, or overburn—The substances reposing on a bed of stream tin or surface covering the lode.

Burning-house—The furnace in which tin ores are calcined to sublime the sulphur from pyrites; the latter being thus decomposed, are more readily removed by washing.

Burrow—A heap of deads, attle, rubbish.

Button—The result of an assay in fine copper.

Cage of a whim—The barrel on which the rope is wound.

Cal—Wolfram.

Cand or Kand—Fluor.

Capel—A stone composed of quartz, schorl, and hornblende, usually occurring on one or both walls of a lode, and more frequently accompanying tin than copper ores.

Captain—One of the superintendents of the mine.

Captain dresser—Superintendent of the dressing of the ores.

Capillary—Long hair-like substances (viz., native silver) are so called.

Carrack—See *Capel.*

Cases of Spar—Veins of quartz (not containing ores) which have not a direction parallel to the lodes.

Casing—A division of wood planks, separating the footway, in a whim, or engine-shaft, from one another, also dividing the shaft, so as to admit the pumps, and for drawing the ores or attle to surface.

Cathead—A small capstan.

Caunter lode—A lode which forms a considerable angle with the ordinary direction of the other lodes in its vicinity.

Cellular—Composed of cells formed by the intersecting of the laminæ and lamellæ.

Champion lode—The main or principal lode in a mine.

Charger—An instrument in the form of the bit of a carpenter's auger, for charging holes for blasting, which are driven horizontally.

Chimming—A process of similar effect to tossing, but being performed on small quantities of ore, the keeve is supported on the verge of its bottom.

Clack—The valve of a pump of any description.

Clack door—The aperture through which the clack of a pump is fixed and removed.

Claying—Lining the hole (in which gunpowder is to be placed) with clay, to prevent the powder becoming damp.

Cob—To break the ores with hammers in such a manner as to separate the dead or worthless parts.

Cockle—Schorl.

Coffin—Old workings open to the day.

Cost-book—The book employed in Cornish mines carried on upon the cost-book system. Mines so worked are in no way affected by the Joint Stock Companies' Registration Act, but are regulated by the laws of the Stannaries. The plan is to insert in the "cost-book" the name and address of each of the adventurers who first work the mine, with all subsequent transfers of shares, and every expense attached to the undertaking, which being entered in the cost-book, a meeting is held every two months, when the purser presents his accounts, made

up for that period, and the shareholders are thus enabled to judge of the profitable nature or otherwise of the undertaking, before incurring further liabilities; while any one feeling dissatisfied, may, on paying his proportion of the debts due, "sign his name off the cost-book," as it is termed, whereby he ceases to be liable for any future costs, and is entitled to his proportion of value of ores, machinery, &c. See article treating hereon, where the subject is treated on more fully.

Country—The strata or rock through which the vein or lode traverses.

Course of ore—A portion of the lode containing a regular vein of ore.

Cover—The box into which the ore is removed; also the place at the head of the trunk, in which the slimes are by agitation mechanically suspended in water, in the process of trunking.

Crib, or Curb—A circular frame of wood, screwed together, as a foundation for bucking or pulverizing ore in a shaft.

Creases—Divisions of buddled work.

Cross-course—A lode or vein intersecting or crossing a lode at right angles, or any other direction, and which frequently throws the lode out of its regular course.

Cross-course spar—Radiated quartz.

Cross-cut—A level driven at right angles, to take or intersect the lode.

Crop—The best ore.

Crushing—Grinding the ores without water.

Cuneiform—Wedge-shaped.

Cube—A solid figure, contained under six equal squares.

Cupelo—A small furnace.

Cut—To intersect by driving, sinking, or rising.

Costeaning—Discovering lodes by sinking pits on backs of lodes, or in their vicinity, and driving transversely to intersect them.

Chats—Small heaps of ore.

Cofering—Securing the shaft from the influx of water by ramming clay, &c.

Collar of a shaft—The timber by which its upper parts are kept from falling together.

Collar launder—The pipe or gutter at the top of a lift of pumps through which the water is conveyed to the cistern.

Conchoidal relates only to fracture: compact minerals are more or less conchoidal.

Connection or Connecting rods—The larger rods which are attached to the engine-beam.

Core—Miners usually work six hours at a time, and, consequently, four *pare* of men are required for the twenty-four hours—"forenoon core," from 6 A.M. to noon—"afternoon core," from noon to 6 P.M.—"first core by night," from 6 P.M. to midnight—and "last core by night," from midnight to 6 A.M.; occasionally the work is performed by eight-hour cores.

Dam—Choke damp, foul air.

Deads—Attle or rubbish.

Dead-ground—That portion of a lode in which there is no ore.

Dean—The end of a level or cross-cut.

Decrepitate—When a mineral exposed to heat flies with a crackling noise.

Dendritic—See *Arborescent*.

Dialling—Surveying underground or at surface for the purpose of laying down plans or sections.

Dileuing, or Terluing—Washing ores supported on a hair-bottomed sieve in water.

Dippa—A small pit.

Dish—That portion of the produce of a mine which is paid to the land-owner or lord as rent or royalty, usually ranging from $\frac{1}{12}$ to $\frac{1}{24}$.

Dissueing—Is when the lode is small and rich, to break down the strata from one of its walls, by which means it can afterwards be taken away without being deteriorated, and without waste.

Disseminated—Imbedded in the mass of another substance.

Dowsing-rod—The hazel rod of divination, by which some pretend to discover lodes.

Dropper—A branch when it leaves the main lode, or falls into the lode from the "country."

Draft-engine—An engine used for pumping.

Drawing-engine or whim—That employed for drawing ores or attle to surface.

Dredge or Dredging ore—A stone impregnated, or traversed by minute veins or strings of ore.

Driving—Digging or excavating horizontally.

Drift—The excavation made for a road underground.

Dressers—Cleaners of the ore.

Durns—A frame of timber with boards placed behind it, to keep open the ground in shafts, levels, &c.

Dzhu, or Hulk—To dig away a portion of the rock, &c. on one side of the lode or end, that the blast may be more efficient.

Elvan—Porphyry, clay, stone, generally accompanying cross-courses.

End—The further extent of a level or cross-cut.

Engineer—The superintendent of the machinery.

Engine-man—Man who attends to and works the engine.

Engine-shaft—The pit or shaft by which the water is drawn by the engine from the lower parts of the mine, to the adit or surface.

Efflorescence—Minutely fibrous.

Fast—The firm rock beneath the diluvium.

Fang—A niche cut in the side of an adit, or shaft, to serve as an air-course; sometimes a main of wood pipes is denominated a fanging.

Feeder—A branch when it falls into the lode.

Flang—A two-pointed pick.

Flat-rods—Rods for communicating motion from the engine horizontally.

Floran tin—Tin ore scarcely perceptible in the stone; tin ore stamped very small.—(*Pryce.*)

Flookan—A soft clayey substance, which is generally found to accompany the cross-courses and slides, and occasionally the lodes themselves.

Fluke—The head of the charger; an instrument used for cleansing the hole previously to blasting.

Footwall—Is the wall under the lode; it is sometimes also called the underlaying wall.

Footway—The ladders by which the workmen ascend and descend.

Forcepiece—A piece of timber put in a level, shaft, &c., in a diagonal position, for keeping the ground open.

Fork—"Water in fork," water all drawn out; the bottom of the engine-shaft.
Friable—Easily crumbled or broken down.
Furnace—The place in which the ore is placed for the purpose of smelting or reduotion.
Gad—A pointed wedge of a peculiar form, having its sides of a parabolic figure.
Geode—A hollow ball.
Glist—Mica.
Good-levels—Levels driven nearly horizontal.
Gossan—Oxide of iron and quartz, generally found in the backs of lodes near to surface, or occurring at shallow depths.
Grass—The surface.
Grain-tin—Crystalline tin ore; metallic tin smelted with charcoal.
Grate—Stamps grate; a metallic plate pierced with small holes; it is attached to the stamps, and through the holes the stamped ores escape.
Griddle, or Riddle—A sieve.
Grinder—Machinery for crushing the ores between iron cylinders or barrels.
Growan—Decomposed granite; but sometimes applied to the solid rock.
Ground—The country; the stratum in which the lode is found.
Gulph of ore—A very large deposit of ore in a lode.
Gunnies—Levels or workings.
Gurt—A gutter; a channel for water.
Halvanner—The dresser of, or operator on, the halvans.
Halvans—The ores which are not sufficiently rich to be offered for sale until the impurities with which they are mixed are removed by dressing.
Hanging-wall—The wall or side over the lode, in contradistinction to "footwall."
Hauling—Drawing ore or attle out of the mine.
Head-sword—The water running through the adit.
Heave—The horizontal dislocation which occurs when one lode is intersected by another having a different direction. A right or left hand heave is when the part of the intersected lode on the opposite side of the traversing vein is found by turning either to the right or left.
Hook-handles—The handles by which a windlass is worked.
Horse—The dead ground between two branches of a lode, at the point of separation.
House of water—A vugh or space, whether artificially excavated or not, filled with water.
Horse-arm—The part of a horse whim to which the horses are attached.
H. Piece—See *Aitch-piece*.
Hutch—Cistern or box.
Irestone—Hard clay-slate, hornblende, hornblende slate, hornstone.
Investing—Coating or covering another mineral.
Jigger—Cleaner of the ores.
Jigging—Separating the ore with a griddle or wire-bottomed sieve, the heavier substance passing through to the bottom or lower part of the sieve; the lighter substances remaining on the upper part are put by for halvans.
Junction—Applied to where veins unite.

Jumper—A long borer, worked by one person.
Keeve—A large vat.
Kibble—A bucket usually made of iron, in which the ore, &c. is drawn to the surface.
Kibble filler—Man who sends up work, &c. to the surface.
Killas—Clay slate.
Lamellæ—The thin plates of minerals.
Lander—Man who attends at mouth of shaft to receive the kibble in which ores, rubbish, &c. are brought to the surface.
Lappior—The dresser of the leavings.
Laths—The boards which are put behind and supported by the "durns."
Launders—Tubes or gutters for the conveyance of water; their form that of a long box, wanting the upper side and both ends.
Leader of the lode—A branch or small vein; part of the main lode.
Learies—Empty places; old workings or vughs.
Leat—A watercourse.
Leavings—The ores which are left after the "crop" is taken out.
Levels—Galleries driven on the lode usually at ten, twenty, thirty, &c. fathoms below the adit level.
Lifters—Wood beams, to which the iron heads of a stamping-mill are fastened.
Lock-piece—A piece of timber used in supporting the workings.
Lode—See *Vein.* A regular vein producing or affording any kind of metal.
Loobs—Slime containing ore.
Lost levels—Levels which are not driven horizontally.
Machine whim—A rotary steam-engine employed for winding.
Mallet—An instrument used with the borer.
Material man—One who delivers out and has care of the materials.
Meat earth—The vegetable mould.
Mock lead—Blende; sulphuret of zinc.
Moorstone—Granite.
Mundic—Iron pyrites.
Needle, or nail—A long taper piece of copper or iron with a copper point used when tamping the hole for blasting, to make, by its withdrawal, an aperture for the insertion of the rush or safety fuse or train.
Owner's account men—Workmen paid at so much per day.
Pack—To occasion the speedy subsidence of the ore in the process of tossing or chimming, by beating the keeve in which it is performed by a hammer.
Pair, or Pare—Gang or party of men.
Parcel—A heap of ore dressed and ready for sale.
Pass—An opening left for letting down stuff to the level.
Peach—Chlorite.
Pedn cairn—A bunch of ore at a distance from the lode.
Pick—An instrument of common use, as well in agriculture as in mining.
Picker, or Poker—A hand chisel for dzhuing, which is held in one hand, and struck with a hammer.
Pillar—A piece of ground left to support the roof or hanging wall.
Pitch—Limits of the piece of ground set to tributers.
Pitch-bag—A bag covered with pitch, into which powder is put (previously to its being introduced into a damp hole) that it may be protected from moisture.

Pitman—One employed to look after the lifts of pumps and the drainage.
Pitwork—The pumps and other apparatus of the engine-shaft.
Plat—Ground taken away in the mine to contain any ores or deads.
Plunger—The piston or forcer of a forcing-pump.
Plunger lift—The set of pipes attached to a forcing-pump.
Point of the horse—The spot where the lode is split or divided into two or more branches.
Pol-roz—Pronounced polrose ; the pit underneath a water-wheel.
Pot-grown—Soft decomposed granite.
Prian—Soft white clay, esteemed a favourable sign when found in a lode.
Pril—A solid piece of virgin metal, or the button from an assay.
Produce—Fine copper contained in 100 parts of ore.
Purser—The cashier or paymaster at the mines.
Quere—A small cavity or fissure.
Rack—An inclined frame on which the ores and slimes are washed and separated.
Racking—Is a process of separating small ore from the earthy particles by means of an inclined wood frame ; the impurities being washed off, and the ore, remaining near the head of the rack taken from thence, undergoes tossing.
Ramose—Branchiform.
Reed, or Spire—Gorse, or other tubular vegetable, into which gunpowder is put to convey a train from the snoff to the charge, the reed being put into the aperture made by the needle.
Refining—Separating the ores.
Relief—When one workman of the same pair changes core, or takes the place of another.
Riddle, or Griddle—A sieve.
Rising—Digging upwards.
Row—Large stones.
Rullers—The persons who work the wheel-barrows underground.
Run—When excavations fall together.
Run of a lode—Its direction.
Rush—Used for the same purposes as the reed and spire.
Scal—A shale or portion of earth, rock, &c., which separates and falls from the main body.
Scovan lode—A lode having no gossan on its back or near the surface.
Scraper—A piece of iron used to take out the pulverized matter which remains in the hole when bored, previously to blasting.
Seam—A horse-load.
Sett—A mine or number of mines taken upon lease.
Set of timber—A frame complete to support each side of the vein, level, or shaft.
Set-off—The part of a connecting rod to which the bucket rod is attached.
Shaft—A sinking or pit either on the lode or through the country.
Shaking—Washing the ores.
Shammel—When ore or water is lifted part of the required height by one machine or person, and part by another.
Shears—Two pieces of wood placed in a vertical position, or nearly so, on each side of shaft, and united at the top, over which by means of a

pulley passes the capstan rope. This is for the convenience of lifting out or lowering into the shaft timber or other things of great length and weight.

Shelf—The firm rock.

Shieve—The pulley over which the whim rope passes.

Shoding—Tracing stones from the lower ground to the lode whence they were separated or torn by some convulsion of nature.

Shooting—Shutting or blasting; fracturing and separating by the use of gunpowder.

Sinking—Digging downwards.

Skimpings—Skimmings of the light ores, &c. in the dressing process.

Slide—A vein of clay which, intersecting a lode, occasions a vertical dislocation.

Slimes—Mud containing metallic ores; mud or earthy particles mixed with the ore.

Smelting—Reducing the ores by means of fire.

Snoff, or Match—A substance, frequently brown paper, or other slowly combustible substance, which is ignited at one end, the other being in contact with the rush or train in blasting; the slow combustion is to permit the escape of the labourers.

Sollar—A small platform at the end of a certain number of ladders.

Spalling—The breaking up into small pieces, for the sake of easily separating the ore from the rock, after which it undergoes the process of cobbing.

Span beam—The horizontal beam passing over the whim in which the upper pivot of the perpendicular axis moves.

Stamps—Machinery for crushing the ores with the presence of water.

Stamp head—The iron weight or head connected with the stamps.

Standard—The regulation of the standard depends entirely on the price which fine copper bears in the market, rising and falling in the same proportion. Supposing the produce of a parcel of ore to be 10, and the price at which it was sold to the smelter to be 8*l*. 18s., the standard of that parcel will be thus obtained:—10 tons of the ore will be required to yield one ton of fine copper—therefore, 8*l*. 18s. × 10 = 89*l*. will be the value of the ore containing a ton of metal. The returning charge of 2*l*. 15s. must then be deducted, which in like manner multiplied by 10, gives 27*l*. 10s.; this added to the former makes 116*l*. 10s., being the standard of that parcel. Low produce ore naturally brings a higher standard.

Stannary laws—Regulations for the management, &c. of tinners, administered by equity judges resident in Cornwall and Devon.

Stem—A day's work.

Stope—*To stope*, to excavate horizontally, or beat away the backs.

Spar—Quartz.

Spend—To break ground; to work away.

Squat of ore—See *Bunch*.

Strake—A launder, or box of wood without ends, in which the process of washing or tying is performed.

Strapping plates—The iron plates by which the connection rods are fastened to each other.

Stream tin—Tin ore found in the form of pebbles in vales and streams.

Streamers—The persons who work in search of stream tin.

String—A small vein.

Stuff—Attle or rubbish.

Stull—Timber placed in the backs of levels, and covered with boards or small poles to support rubbish.

Sturt—When a tributer takes a pitch at a high tribute, and cuts a course of ore, he sometimes gets from fifty to two or three hundred pounds in two months; these great wages are called a sturt.

Sump—A pit; the bottom of the engine-shaft.

Sump-shaft—The engine-shaft.

Sumpmen—The pitman's assistants; men who attend to the machinery in the engine-shaft.

Takel or Tackle—Windlass, rope, and kibble.

Tamping—The material, usually soft stone, placed on the gunpowder in blasting, in order to confine its force, which would otherwise pass up the hole; also the process of placing the material.

Tamping iron or bar—Tool used for beating down the earthy substance on the charge used in blasting.

Team—To lade water in bowls.

Thrown—either up or down—Is when a slide intersects a lode, the dislocation being shown by a transverse section.—*Thrown up*, is when the undiscovered portion of the intersected lode is found to have been apparently lengthened—*Thrown down*, is the reverse.

Ticketings—The weekly public sales of ores.

Timber man—The man employed in placing supports of timber in the interior of the mine.

Tollar—A person who periodically examines the limits of ground producing tin ore belonging to himself or (the lord) his employer.

Ton—The ton varies in different districts; the common ton is 20 cwt. of 112 lbs. or 2,240 lbs. In Cornwall, the mining ton is 21 cwt. of 112 lbs. or 2,352 lbs.

Tossing, or Tozing—A process consisting in suspending the ores by violent agitation in water, their subsidence being accelerated by packing—the lighter and worthless matter remains uppermost.

Trade—Attle or rubbish.

Tram-carriage—The carriage (usually made of iron) used on a tram-road.

Tram-road—Iron railroad way.

Treloobing—See *Tossing*.

Tribute—Proportion of the ore which the workman (tributer) has for his labour.

Tributers—Men whose pay is a certain proportion of the ore or value of the ores they raise.

Tribute pitches—The limited portions of a lode which are set to "a pair" of tributers, beyond which they are not for the time being permitted to work.

Tunnel head—The top of a furnace, at which the materials are put in.

Turned house—A term used when a level, in following branches of ore, is turned out of the original direction.

Trunk—A long narrow cistern or pit, in which the ore and slimes which are mixed are separated by the subsidence of the former, and the washing off the impurities—the inclined box in which the ore and slimy impurities are separated in the process of trunking.

Trunking—Process of extracting ores from the slimes—subsequently the ores undergo the processes of racking and tossing.

Tummals—A great quantity; a heap.

Tut work—Work in which the labourer earns in proportion to the amount of his labour; being paid for driving at a certain price per fathom.

Tuyere—The aperture through which the air or blast is introduced into the furnace.

Tying—Washing.

Underlayer—A perpendicular shaft, sunk to cut the lode at any required depth.

Underlay-shaft—Shaft sunk on the course of the lode.

Van—To wash and cleanse a small portion of ore on a shovel.

Vein—See *Lode*.

Vugh, or Vogle—A cavity.

Washing—The ore undergoes occasionally two or three washings; the first process being that of washing the slimes and earthy particles from the rougher and larger stones of ore.

Water in fork—When all the water is extracted.

Well—The lower part of a furnace, into which the metal falls.

Wey—A term used in South Wales, as applied to collieries, signifying ten tons.

Whim—A machine worked by horse, steam, or water, for raising ores, &c.

Whim driver—Man who attends to the horse in the whim.

Whim rope or chain—The rope or chain by which the kibble is attached to the winding engine or whim.

Whim shaft—The shaft by which the stuff is drawn out of the mine by horse or steam whim.

Whip and derry—A kibble drawn to the surface by a horse, the rope attaching one to the other simply passing over a pulley.

Willd—See *Blende*.

Winch, or Winze—Contraction of windlass; the wheel and axle frequently used for drawing water, &c. in a kibble by a rope.

Windbore—The lowest pump in which there are holes to admit water.

Winding engine—One used to draw up ore, attle, &c.

Winze—A sinking on the lode communicating one level with another, for proving the lode or for ventilating the drivings.

Work—Ores before they are cleansed or dressed.

Working barrel—The pump in which a piston works.

Working big—Sufficiently large for a man to work in.

Zawn—A cavern.

Zighyr—When a small slow stream of water issues through a cranny it is said to zighyr or sigger.—(*Pryce.*)

DERBYSHIRE.

Adit—An horizontal level taken up at the foot of a hill, and either driven on the lode or to intersect it, for unwatering or draining the mine at that level, and also occasionally used for bringing out the ores. The top adit is the adit first driven, deep adit the lowest adit driven; air adit is the adit driven purposely for ventilating the mine.

Arched—The roads in a mine when built with stones or bricks are generally arched; level drifts and horse roads, either when cut in coal or in other strata, are formed arch fashion in the cutting for better security.
Bank, or Benk—The face of the (coal) works or place where the miners are turning out the coal, sometimes called benk face.
Bar master—An officer who superintends the lead-mines.
Bar mote—A hall or court in which trials relative to lead-mines are held.
Bassit—The outcrop of the strata: when a substance, as coal, appears at the surface, it is said to be bassit; also sometimes used to signify the upper end of the works, as the bassit or upper end.
Bearer, or Biard—A large piece of timber to support the cistern and pumps in an engine-shaft.
Balland—Dusty lead ore.
Belt—A strap to which is attached a chain by which coal-miners draw the loaded corves of coal.
Bender—A piece of iron attached to trunks, or barrels, to which the pit rope is affixed.
Bina—Indurate clay; a name given by miners to any indurate argillaceous substance.
Binghole—A hole through which the ore is thrown.
Bingplace—The place where the ore is laid ready for smelting and measuring.
Boring bit—A piece of steel placed at the end of the borer.
Blast—The air introduced into a furnace.
Blasting—A hole made with a borer in which gunpowder is introduced, which being confined, and set fire to by a match, forces off a portion of the rock or lode—the process is called blasting.
Board, or Board gate—An adit is driven board when it runs in a transverse direction to the grain or face of the coal.
Borer, Auger, or Drill—A round piece of iron, the one end steeled.
Bow—See *Bender*.
Bowse—Lead ore as cut from the vein.
Breast—The face of the (coal) workings.
Brettis (in coal mines)—A quantity of wood packed together, and the interstices filled up with slack or rubbish.
Brettis way (ditto)—A way or road in the mine supported by brettises, built up on each side after the coal has been wrought out.
Bucker—A flat piece of iron with a wooden handle used for breaking or crushing the ore by hand.
Bucklers, or Tacklers—Small chains put round the coals, when loaded in corves, to prevent them from falling off.
Buddle—A frame made of wood and filled with water, in which the lead ore is washed.
Budling—Washing inferior ore lead to free it from extraneous matter.
Bule—A piece of wrought iron to put round buckets or clack doors on large pumps, to hold them in their respective places.
Bunding—Wood placed on which the refuse cuttings or deads are thrown.
Butty—In collieries a person who contracts to raise coal by weight or measure.
Cank—Whimstone.

Cap, or Lid—A flat piece of wood placed between the top of the punch and the roof of the mine.

Cat dirt—A substance also called toadstone, being sometimes clay, coal, and pyrites of iron; at others, a kind of earthy scoria not unlike lava.

Chair—Used in drawing up ore or coal.

Chisel—See *Drill*.

Churndrill—A large drill from four to six feet long, commonly made with a chisel point at each end.

Cleet—A wedge.

Clivis—A hook with a spring to prevent its unfastening.

Coesteads—A small building.

Cofer—Cofering is beating a quantity of clay round the bricking in shaft to prevent the water coming through, and to hold it back in the strata.

Colliery bailiff—Superintendent of the colliery.

Cope—To agree to get lead ore at a fixed sum per dish or load, or other measure.

Coper—One who agrees to get lead ore by bargain.

Corf—A square frame of wood to load coals on; a kind of sledge used to carry ore from the miners at work to the shaft bottom.

Creep—The weight of the incumbent strata after the coal has been partially worked out.

Crib, or Curb—A circular frame of wood, either pinned or screwed together, to serve as a foundation for the bricking in a shaft.

Cross-cuts—Lodes or levels driven in a diametrical direction, across the range of the vein.

Crow-bar—A lever from six to eight feet long.

Cupelo—A small furnace, worked by blast.

Curb—See *Crib*.

Cutting—An air-course set up at either end of the work after the coal has been wrought out.

Crosses and holes—When a person discovers a vein, and has no means to possess it for want of stowces, he marks the ground with crosses and holes, by which means he possesses it until he can procure stowces.

Dam—Dams are made for various purposes underground, either for holding back water or noxious vapours, such as choke or fire damp. They are generally built either with sand or clay.

Dan—A square frame of wood to draw coals from the work to the main roads underground.

Deads—Cutting of stone of no use, attle or rubbish.

Deep level—The watercourse leading to the engine-shaft, being always the deepest adit in the mine.

Dial—A compass used to take bearings in mines.

Dialling—Taking the different bearings of the various ways, gates, &c. in a mine; surveying.

Dish—A measure containing fifteen pints Winchester measure.

Door in a mine—Is sometimes used to open and shut, to increase the circulation of air.

Dresser—See *Loading pick*.

Drift—The excavation made for a road underground.

Drill—An instrument for boring shot and other holes.

Driving—Cutting and blasting horizontally, applied to making a level or adit.

End—An adit is said to be driven end when it is in a line with the grain of the coal.
Ending—An adit driven in a direction with the grain of the coal.
Elve—The shaft or handle of a pick.
Face—The face of the coal is at right angles with the grain.
Fang—A niche cut in the side of an adit or shaft to serve as an air-course; sometimes a main of wood pipes is denominated a fanging.
Fausted—Refuse lead ore requiring to be dressed finer.
Fault—An intersection of the strata.
Feigh—The refuse washed from the lead ore.
Flat—Flat work, &c., when a vein, &c. is horizontal.
Forks—Pieces of wood used to keep the side up in soft places.
Foundermere—The first thirty-two yards of ground worked.
Foundershaft—The first shaft that is sunk.
Forefield—The face or extent of the workings.
Forefield end—The farthest extremity of the workings.
Freeing—Entering a mine or vein in the barmaster's book.
Fuzze—Straws or hollow briers, reeds, &c., filled with powder.
Gallery—A drift or level.
Gate—Road or way underground; it has various uses, either for air, water, or for bringing out the mine, coal, &c.
Gin—The machine by which the coal or ore is raised from the mine.
Gobbing—The rubbish remaining after the coal has been extracted.
Grove—A mine.
Gingoni—Walling up a shaft, instead of timbering, to keep the loose earth from falling.
Hade—The underlay or inclination of the vein.
Hadings—When some parts of the vein incline and others are perpendicular.
Hangbench—Part of the stowces.
Hanging-side—The wall or side over the vein, or to which it hangs.
Horn—A line running horn is at an angle of 45 deg. with the face of the coal.
Jackhead-pit—A well sunk inside the mine for various purposes.
Jackhead-pump—The house water-pump of an engine is sometimes so called.
Jig-pin—A pin used to stop the machine in drawing when necessary.
Judge—A staff to measure underground work with—viz., the holing in coal-work.
Jumper—A large borer, an iron instrument worked by hand, and steeled at each end like chisel bits.
Kevil—A sparry substance found in the vein composed of calcareous spar, fluor, and barytes.
Kibble—A bucket used for drawing up lead ore out of the mine.
Kit—A wood vessel of any size.
Knits—Small particles of lead ore.
Knockings—Lead ore with spar as cut from the vein.
Knockstone—A stone used to break the lead ore on, but sometimes it is a piece of cast-iron.
Leap—The vein is said to leap when a substance intersects it, and it is found again a few feet from the perpendicular.
Leadings—Small sparry veins in the rock.

Level—An adit, gallery, or sough; generally the main watercourse in a mine.

Lid—See *Cap*.

Limp—An iron plate used to strike the refuse from the sieve, in washing lead ore.

Loading-pick—A pick made purposely to cleave or rive up coals, and prepare them for laying on the corves.

Loch—A cavity in a vein.

Lot—A certain proportion taken as dues for the lord of the manor, or owner of the mine.

Maul—A large hammer.

Maundrill—A pick for various purposes, but generally used to undermine.

Mear—Thirty-two yards of ground on the vein.

Needle, or Pricker—A thin rod of iron put in shot-holes, while they are rammed up, and which being then drawn out leaves a hole into which the match is introduced for setting fire to the charge.

Noger—A jumper or borer; a drill.

Nogs—Square pieces of wood which are piled on each other to support the roof of a coal-mine.

Noper—See *Loading-pick*.

Old man—Places worked centuries ago, or in former ages.

O'erlayer—A piece of wood on which the sieve is placed after washing the ore in a vat.

Opens—Large caverns.

Open cast—When a vein is worked open from the *day* or surface.

Ore—The mineral as produced in a mine.

Pack—A quantity of materials, either wood or coals, &c. piled up to support the roof, or for other purposes.

Pee—A piece of lead ore.

Pillar—A support for the roof, of timber, stone, or other material.

Pipe—A vein running unlike a rake, having a rock roof and sole.

Plumb—A line and lead to measure with.

Poling—A plank or piece of wood to prevent earth or stone from falling.

Possession—When stowces or wooden frames are placed on a vein, it is said to be in possession.

Post—A pillar of coal or other strata left.

Pricker—A thin piece of iron used to make a hole for the fuze or match to fire a blast.

Pringap—A variable distance between two possessions.

Punch—A piece of timber used as a support for the roof.

Rake—An oblique vein.

Ratchell—Loose stones.

Rib—A pillar of coal left as a support for the roof.

Ricket—See *Fang*.

Rider—A rocky substance which divides the vein.

Ringer—A crowbar.

Rising—A man working above his head in the roof is said to be rising.

Roof—The part above the miner's head; that part of the strata lying immediately upon the coal.

Rubble—See *Ratchell*.

Run—When the earth falls and fills up the shafts or works, it is said to run.

Safety fuze—An excellent invention, by Messrs. Bickford, Smith, and Davey, of Camborne, for the safe and certain blasting of rocks in mines and quarries.

Scaffold—In a mine, a platform made, where some miners work above the heads of others.

Scouring bit—A bit attached to the end of boring-rods for the purpose of extracting the rubbish.

Scraper—An instrument to extract the pulverized rock, &c. from shot-holes when boring.

Scrin—A small vein.

Seat, or Sole—The floor or bottom of the mine.

Shaft—A pit, the perpendicular entrance to the mine.

Shakes—Fissures in the earth.

Shift—The time a miner works for one day.

Shot—Blasting.

Sinking—Working deeper or downwards.

Skep, or Skip—A square box (usually wrought iron) in which the coals are sent up to the pit's mouth.

Sled—A sledge to draw ore without wheels.

Slipes—Flat pieces of iron for the corves to slide on.

Slit—A communication between two adits.

Smelting—Reducing the ore to metal.

Smitham—Small lead-ore dust.

Smut—Decomposed dark earthy substance, or coal decomposed by the air at the surface of the earth.

Sole—The seat or bottom of the mine, applied to horizontal veins or beds.

Sole-tree—A piece of wood belonging to stowces to draw ore up from the mine.

Sough—An adit or level for carrying off the water.

Spanner—An instrument to turn screws with.

Spindle—A part of the drawing stowces.

Stays—Pieces of wood to secure the pumps in the engine-shaft.

Stemmer—A piece of iron with which clay is rammed into the shot-holes to make them water-tight.

Stemples—Wood placed to go up and down the mine instead of steps.

Stickings—Narrow veins of ore.

Stope—A piece of mineral ground to be worked.

Stoping—Cutting mineral ground with a pick; working downwards.

Stopping—A dam of bricks or clay to turn the course of the air.

Stowce—Drawing stowce; a small windlass.

Strings—Small veins of ore.

Stowces—Pieces of wood of particular forms and constructions placed together, by which the possession of mines is marked; a pair of stowces possess a mear of ground.

Sump—A shaft underground, a well or lodge for water.

Swallows—Caverns or openings where the water loses itself.

Tacklers—Small chains to put round the loaded corves.

Thurl—A long adit in a coal-pit.

Thurst—The ruin of the incumbent strata after the pillars and stalls are wrought out.

Trogues—Wooden drains like troughs.

Troubles—Faults or interruptions in the stratum.

Trunks—Wooden spouts to convey wind or water; small boxes in which rubbish or dirt is sent up out of the mine.

Tub—A cast-iron cylinder put in the shaft instead of bricking, for the purpose of beating out the water and making it rise to a level.

Tugs—Hoops of iron fastened on the corves to which the tacklers are affixed.

Turntree—A part of the drawing stowces or windlass.

Underlay—When a vein hides or inclines from a perpendicular line, it is said to underlay.

Vein—Any substance different from the rock; a rake vein is oblique; a pipe vein nearly horizontal.

Vat—A wooden tub used to wash ore and mineral substances in.

Wash-hole—Where the refuse is thrown.

Walling—When the roads in the mine are made with stone, it is called walling. The side of the mine or gangart is frequently called the wall.

Wastes—Vacant places left in the gobbing, on each side of which the rubbish is packed up for the better support of the roof.

Water-holes—Places where the water stands.

Weigh-board—Clay intersecting the vein.

Wedge—An iron tool to get ore, split rocks, &c.

Whim—An engine or machine to draw ore, &c., worked by horses.

Wind-way—A passage left purposely for air.

Wind-bore—The bottom pipe in a lift of pumps.

Wind-holes—Shafts or sumps sunk to convey wind or air.

Windlass—A machine used to draw up ore, &c.—See *Stowce*, by which name it is commonly called.

Windless—A place in a mine where the air is bad or short is said to be windless or airless.

Yokings—Pieces of wood ascertaining possession; stowces.

SOUTH STAFFORDSHIRE.

Air-head—A channel 2 feet 3 inches by 3 feet 6 inches, driven on a level with the top of the gate-road, and about 4 yards on one side of such gate-road.

Bildas, or buildhouse—The men going down at 6 and working till 9, and sometimes 10 o'clock, is termed a bildas, for which the men get nothing but a drop of beer. This was originally denominated *build-house*, from the fact of the butty being able to *build* so many *houses* from the exactions thus made upon the poor men.

Boring apparatus—Consisting of triangles, springing-pole, rods, punches, shell, &c.

Blowing-tools—A small set of blasting instruments.

Breakes—Fissures, or cracks, that are found in working near old works, arising from the consolidation of such old workings.

Back-horse—The horse that draws the loading skip from the loaders to the waggon-hole.

Bolt-hole—A passage same size as gate-road, but leading from the gate-road into a side of work, in which the dams are generally placed.

Bandsman—A man who loads up the coal.

Banksman—A man who lands the skip at surface.
Bow—A piece of wrought iron passing from one side to the other of a skip, by which it is let down into the mine.
Bating—Lowering the gate-road, or other passage.
Benching-up—Holing above the measure, and then breaking up the lower part.
Bowke—A small wooden box, used for drawing clay and ironstone, and for sinking.
Butty—A getter of coals, or ironstone, by contract by the ton.
Curb—A circular piece of wood, pinned together as a foundation for the bricking of a shaft.
Crop—The line of inclination of a mine.
Calcining—Roasting iron ore.
Charter-master—See *Butty.*
Cutting—The coal being cut perpendicularly round the pillars and ribs, in order to let the coals fall.
Cog—A small square building of rough stones, or coals, left to support the roof during the operation of holing.
Crowbar—Wrought-iron levers of various lengths, for rifting out the large coals.
Capstan and Rope—Winding apparatus, with levers and strong rope, used when repairing pumps, trees, &c.
Cleansing—Clearing and making fit for traversing old gate-roads; carrying out slack from the holers; clearing the sumps at bottom of shafts, to admit of water-room, &c.
Cropping-out—When the seam crops out at surface.
Doggy—An underground superintendent, employed by the butty.
Downfall—A downthrow.
Dialling—Surveying the different ramifications of the mines by means of the magnetic needle.
Dresser—A large pick, used for preparing the large coals for loading into the skips.
Driving—Cutting and blasting horizontally, applied to making a level, or air-way, &c.
Dip—The line of depression of a mine.
Dan—A small waggon, used in ironstone-mines.
Damp—Carbonic acid gas.
Dog-hook—A long hook, by which the empty skip is drawn in any direction.
Damp sheet—A large coarse sheet, placed across the gate-road, to force air in another direction.
Doors—Stoppings for air in main gate-road.
Draught—The quantity of coals raised to bank in a given time.
Drink-time—Meal-time.
Drum—That part of the winding machinery on which the rope or chain is coiled.
Drop—Applies to a quantity of coal caused to drop by cutting—sometimes the thickness of 3 feet, and at others of 6 feet.
Druggon—A square wrought-iron or wooden box, used for lowering clear water into the mine for the horses, and for conveying water into the interior of the mine, &c.
Dams—Stoppings of fine sand and brickwork, of various thicknesses, in

the gate-roads, to exclude the atmospheric air from old workings, to prevent spontaneous combustion.

Engine-pit—The pumping-shaft.

Elve—The handle of a pick.

Fault—A dislocation, with rock, or other foreign matter, lying between.

Fire-stink—Arises from the decomposition of iron pyrites, which is so abundant; hence the necessity of ribs, dams, &c.

Fast-end—The part of a face that juts against the solid.

Foot-hook—The large hook that is hooked to the bow of a skip, or tacklers, in drawing coals up the shaft.

Foot-hook chain—A strong chain at the end of the rope, and connected with the foot-hook.

Face—In ironstone-mines, the work in progress.

Fleaing—Is practised when a gate-road, or other work, is about to be abandoned, as a system of robbing, as it is termed in the north, or an endeavour to thin the ribs to the greatest extent.

Fighting—Applies to the ventilation when reversed—as the upcast becoming the downcast, and *vice versâ.*

Ground Bailiff—A superintendent, visiting the mines about once a week; has the entire direction, and should be made answerable for all accidents from breakages, bad ventilation, &c.

Gin—A wooden drum, with vertical shaft, cross-piece, beam, &c., by means of which shallow mines are realized.

Gate-road—A passage driven on the floor of the coals about 10 feet wide, and 10 feet high, used to carry the coals along.

Gob—The refuse that is left behind when the work is completed, as small coal, earthy matter, inferior ironstone, &c.

Gob-road—A road that passes through that part of the mine which has been previously worked.

Garland—A trough, or gutter, round the inside of the shaft, to catch the water running down the sides.

Holing—The lower part of the coal being taken away, 2 feet 3 inches in height, honourably, in order to bring down the overlying mass.

Hanger-on—The man who hangs the skip on at the bottom of the shaft.

Horse-fettler—The man whose whole duty it is to provide for and attend to the horses underground.

Hanging—Applies to that part of the seam which remains—as when the bottom coal is taken away, the top coal is hanging.

Hammer—Large 8 or 10 lb. hammers, used for driving the wedges in breaking up large coals for loading.

Horns—Guides for the rope on the drum.

Hand-gears—Small winding hand-barrel, used for preliminary sinking, or to realize very shallow mines.

Holing-shovel—A short-handled, round-bladed shovel.

Hovel—An erection at surface, near the pit's mouth, for the convenience of the banksman.

Jackey-pit—A small shaft sunk inside the mine, for various purposes.

Jig-chain—A chain hooked to the back of a skip, and running round a post, to prevent its too rapid descent on an inclined plain.

Knocking-up—The banksman beating (rather peculiarly) the runner at surface, to inform the miners below that it is time to come up.

Knob—A small support for the roof.

Lazyback—The place at surface where the coals are loaded and stacked for sale.

Lid—A piece of wood placed between the top of a prop of timber and the roof of the mine.

Level—A water-passage underground.

Log, or Baby—A balance weight, placed near the end of the pit-rope, to prevent its running back over the pulley.

Landing—The banksman receiving the loaded skip at surface.

Ladder—Strong wood ladders, 10 to 20 feet long, to enable the collier to affix his scaffolding, when cutting the top coals in.

Lever—Strong oak levers, 15 feet long, used to lift loaded skips on to the rails, in case of their getting off, or accident, &c.

Lamp—The safety-lamps of Davy, Clanny, Stephenson, and Upton and Roberts. The majority are made by local ironmongers.

Launder—A large wrought-iron or wooden spout, into which the water-barrel is lowered, and which conveys the water to a culvert, or other outlet, near the pit's mouth.

Mobby—A leathern girdle with small chain and hook, used by lads in drawing the ironstone from low places, on small bowkes.

Mine Surveyor—A person who dials the workings of a colliery as often as requisite, and makes plans of the mines got and ungot.

Machine—The weighing apparatus used to weigh the coals at surface.

Man-o'-war—A small pillar left in some critical situation in a side of work.

Navvy—That part of the face of an ironstone-mine lying between two roads.

Net—A strong cord net by which the large and powerful horses are let into the collieries.

Openings—Those parts of the side of a work that are between the pillars and between the pillars and ribs.

Open Work—A coal quarry.

Pricker and Puller—A long sharp-pointed instrument (not unlike a boatman's shaft), used to break out the spurns left in cutting the coals.

Pillar—A square piece of coal, 9 yards square, left to support the roof, but which in completing the side of work is often robbed—viz., parts cut away.

Parting—A small joint in the coal-measure; and when one road leads out of another, that is a parting also.

Pikeman—A man who holes or cuts the coal.

Pit-frame—The framework carrying the pit pulley.

Pit-eye-pillar—A solid piece of coal, left round the bottom of shafts for their protection.

Ring—A circular piece of wrought-iron, about 8 inches deep, used to place on the skip of coals, to increase the load.

Rise—An upthrow.

Royalty—The dues payable to the real owner of the colliery.

Rib—A barrier of coal, left between each successive side of work, to prevent either water or obnoxious vapours, arising from such old workings, spreading over the whole pit.

Runner—Landing-waggon for the skip at surface.

Roofing—When the top of the loaded skip wedges against the top of the gate-road.

Rake—A strong iron rake, for loading up into iron baskets the small coals.

Runner—Applies when any part of the winding-machinery breaks, and allows the loading skip or miners to descend the shaft with the greatest velocity.

Rate—The sides of the gate-road, or other works, falling off and obstructing the passage.

Rodney—A roughly-constructed platform, with old rails, near the pit's mouth, upon which a large fire is made during the winter nights, to light the bank.

Stint—A given quantity of work to be performed.

Side-bassett—A transverse direction, or at right angles with the line of dip.

Sleepers—Are of wood or cast and wrought iron, according to their different purposes.

Setting—Timber setting, or props, in various lengths.

Sump—Water-room at the bottom of a shaft.

Sump-planks—Strong balks of timber bolted together, forming a temporary bottom, or scaffolding, for the shaft.

Side-laning—Making the gate-road (when abandoned for that purpose) into an opening 10 yards wide—viz., making the gate-road part of the new side of work.

Snatch—A small chimney at surface, about 6 or 8 feet high, connected with an air-furnace and trumpeting, used to ventilate very limited underground workings by the means of one shaft, but much disused now.

Stall—An opening made between pillars in the direction that the work is progressing, and the transverse openings—also termed *openings*.

Straight-stall—An excavation made into the thick coal, having the solid coal left on three sides of it.

Scaffold—Planking elevated by stays and ladders, in order to allow the miner to ascend and disengage the coal in the upper part of the seam.

Shaft—A pit from 5 to 8 feet diameter, the smaller used for ironstone and the larger for coal mines.

Shift—The extent of time taken for any particular operation.

Slipes—The sledges at the bottom of the skip, used to draw the coals upon from the work in progress to the railroad.

Smut, or Mucks—Bad soft coal, containing much earthy matter, found in the immediate locality of faults.

Stays—Pieces of wood to secure the pump-trees in the engine-pit.

Stamp—A mark cut in the roof or sides of the mine, as a point of reference, to show the amount of work done.

Spurns—Small ties or connections, left between the coals hanging and the ribs and pillars, to insure safety to the miner during the operation of cutting.

Sulphur—Carburetted hydrogen gas.

Stage—A particular distance that a horse travels along the gate-road, and where candles are regularly placed.

Shot—Blasting.

Skip—A sledge-shaped waggon with a wrought-iron bow, used to draw the coals up the shaft.

Straw—A fine straw filled with powder, used as a fuse.

Stone—Ironstone.

Side of Work—An excavation in the 10-yard coal, varying in extent, composed of a series of 10-yard square openings, and 9-yard square pillars, according to the nature of the overlying strata.

Spout—A channel same size as air-head, and about 4 yards long, driven from the air-head into the gate-road at about every 15 yards, so as to always keep the communication as forward as possible.

Sumping—A small square shaft, generally made in the air-headings, when crossing faults, &c., or made to prove the thickness of coal, &c.

Shet—The roof of the coal-mine when broken down.

Trade—Demand for coal.

Trumpeting—A small channel cut behind the brickwork of the shaft.

Throwing—Is generally done in the night, by breaking out the small spurns left at certain distances during the cutting, and so entirely disengage the hanging coal from the ribs and pillars—having nothing left then but its own cohesion.

Tipe—To upset, or overthrow a skip.

Turn-out—A short loop line of railway, made in order to allow one skip to pass the other in the gate-road.

Tie—A support for the roof attached to the rib, forming the shape of the letter.

Trow—A wooden spout, made in various lengths, and from 4 inches to 2 feet square, used for carrying air, &c.

Tacklers—Four pieces of chain, terminating at one end with a hook, and at the other in a ring, used to tackle up the skip with when drawing it up to the shaft.

Thurl—To make a breach into former workings or gate-roads.

Tubbing—Cast-iron cylinders, in pieces, bolted together and placed in the shaft, to enable the sinkers to penetrate quicksand, water, &c. in safety.

Ventilating-flue—Trumpeting, commonly called, but to which a new name has been recently given.

Ventilating-stack—A stack 90 feet high, with partition, and large air-furnaces, and connected with the ventilating-flue—not much used at present.

Waggon-hole—That part of the railroad ending in the side of work.

Wedge—Used to break up large coals, rock, &c.

Whimsey—An engine used to draw up coals; applied more to the old atmospheric engines.

Way-end—Applied in ironstone-mines to that part of the face where the road enters.

Wind-way—An air-way leading from one road to another.

Water-barrel—A large wrought-iron barrel, with a self-acting valve in the bottom, used in drawing water, where there are no pumps.

Waggon—A square platform, with four wheels placed under, for the purpose of conveying the skip of coals from the workmen to the bottom of the shaft.

Yard-stick—A three-feet measure, to determine the extent of holing done, &c.

NEWCASTLE-ON-TYNE.

Air-boxes—Tubes of wood used for ventilation where there is only one passage or opening.
Air-crossing—An arch built over a horseway or other road, with a passage or air-way above it.
Arrage—A sharp point or corner.
Back—A slippery division in the coal-seam, extending from the thill to the roof.
Back-end—The part of a judd left after the sump is brought down.
Back-skin—A covering of leather worn by men working in pumping pits, or other wet places.
Backing-deals—Deals placed behind cribs to keep back loose strata.
Bank—The surface, or top of the pit.
Bankman—The man who lands the coals at the top of the pit.
Bargain—A piece of work to be done at a certain price.
Bargain-men—Men who work by the bargain.
Barrier—A strong pillar of coal left between two collieries, or between two districts of workings.
Barrow-way—An old term for tramway, originating from the time when the coals were brought out from the workings in barrows.
Barrowmen—See *Putters*.
Basset—The outcrop of the coal.
Battery—An embankment.
Bend away—A signal given to raise up.
Beater—An instrument for beating stemming on a charge of powder.
Bed—The foundation of a wall or cribbing.
Blower—An excessive discharge of gas generally from a fissure.
Bord—A passage driven across the fibres, or grain of the coal.
Borehole—A hole bored through strata to prove their quality.
Bore-rods—Rods used in boring.
Bord-room—The width across an old bord.
Brattice—A wood partition, used for ventilation, when there is only one opening or passage.
Brasses—Lumps of sulphate of iron found in coal.
Brakeman—The man in charge of the winding engine.
Broken—A part of the mine where the pillars are in course of removal.
Boll—A measure containing 9,676 cubic inches.
Bucket—The piston of a lifting set of pumps.
Buntons—Strong balks of timber.
Balks—Where the roof is not level, but comes down into the coal.
Caller—A man who calls the men when time to go to work.
Calling course—The time when the men go to work.
Cage—The shaft carriage.
Canch—A protuberance, or certain thickness of stone to be worked opencast.
Chaldron—53 cwt. The waggons which convey the coals from the pit to the place of shipment carry the above quantity, and are called chaldron waggons.
Chock—A piece of wood for stopping waggons on the top of a bank.
Chock and Block—Tightly filled up.
Chisel—The cutting part of a drill.

Clam—A support or bracket.
Claggy—Adhesive.
Claggy top—When the coal adheres to the roof.
Clack—A valve in the pumps.
Cod—The bearing of an axle.
Coursing the air—Ventilating the workings of the mine.
Corf—A basket for carrying coals.
Corfbow—The handle of the corf.
Corver—The man who makes and repairs the corves.
Crampet—A bracket.
Creep—A heaving-up of the floor of the mine, occasioned by the weight of the superincumbent strata.
Crosscut—A passage driven at an angle with the fibres of the coal.
Crab—A capstan, for raising or lowering of pumps, &c., in a pumping-pit.
Consideration—Money paid to the hewers for bad coal, or for any extra trouble.
Cow—A piece of wood or iron placed behind the crab or gin-start, to prevent it from revolving back.
Coal-pipes—Very thin irregular layers of coal.
Cradle—A suspended scaffold used in shafts.
Collarings—Pieces of wood or iron for securing the pumps in the shaft.
Crib—A circular piece of wood wedged tight in a shaft, to make a foundation for walling or tubbing when the strata are loose.
Cowp—To overturn—when the men exchange working-places they are said to "cowp."
Dant—Soft inferior coal.
Dayhole—An adit or level from the surface.
Daywater—Water which penetrates into the mine through some direct opening to the surface.
Davy lamp—The safety-lamp invented by Sir H. Davy.
Davy man—The man who trims and repairs the Davy lamps.
Deputy overman—The man who lays the plates and sets the timber for the hewers, and has charge of a district of the mine.
Dip—A downward inclination.
Downcast-pit—The pit down which the air passes.
Double working—When more than one man is put to work in any one working-place.
Double-handed gear—Heavy drilling-tools which require two men to use them.
Dogs—Pieces of wood at the bottom of an air-door—the part of the chain which is fastened to the rope.
Drill—An instrument for perforating a hole in the strata, into which a charge of powder is laid.
Drilling-hammer—A hammer used for drilling holes.
Drop—Machinery used in shipping the coals by which the coal-waggons are lowered on to the ship's deck.
Dyke—A dislocation of the strata.
Erles—Earnest-money.
Enginewright—The man who repairs the engines and machinery.
Face—The extremity of the workings.
Falls—Bucket or clack falls—the part which opens and shuts to allow the passage of water.

Fast shot—When a charge of powder is exploded without having the desired effect.

Feeder—A stream or spring.

Filleting—Wood stringing.

Fitter—The person who sells the coals at the shipping port.

Fitting-office—The office for transacting business at the shipping port.

Fittage—Expenses incurred in selling the coals.

Flat—The termination of the horseway, the coals being brought thereto by the putters.

Flap-door—A manhole-door.

Flange—A projection at the top and bottom of pumps when they are bolted together.

Flange bolts—Bolts for fastening pumps together.

Foal—A young boy employed in putting coals.

Foul—When the air of the mine is explosive.

Foulness—The sulphuretted hydrogen gas of the mine.

Fother—One-third of a chaldron.

Frame-dam—A strong separation of wood and clay to stop water back.

Furnace—A large fire at the bottom of the upcast pit, to rarefy the ascending column of air.

Furnace-man—The man who looks after the furnace.

Furtherance—Extra price paid to the hewers, when required to put the coals.

Gait—A journey, or trip.

Gangway—A wooden bridge.

Gavelock—A lever used in working stone.

Gear—Working-tools.

Gears—The trapping of a horse.

Girdle—A thin stratum of stone.

Gin—A horse-machine, for raising men and materials up the pit.

Glut—A piece of wood to fill up behind cribbing or tubbing.

Goafe—A part of the mine from which all the coal has been worked.

Gullet—An opening or fissure in the strata.

Hack—A large pick, used in working stone.

Half-marrow—Young boys, of whom it requires two to do the work of one putter.

Headsman—A putter.

Headtree—A piece of wood, on the top of a prop, to support the roof.

Helper-up—A boy who assists the putters, when they have to bring the coals up a dip or bank.

Headway—A passage driven in the direction of the fibres of the coal.

Hewer—A man who cuts or works the coal.

Hewing—Working the coal.

Heap—The accumulation of stones, rubbish, &c. at the top of a pit.

Heapkeeper—A man who overlooks the cleaning of the coals on the surface.

Hitch—A small dislocation of the strata, which does not exceed the height of the coal-seam.

Hoggers—Stockings without feet, worn by the men when at work.

Hogger-pump—The uppermost pump in a sinking-pit.

Horseback—A portion of the roof or floor which obtrudes into the coal.

Inbye—*Inbyeside*—Further into the mine.

"*Into the house*"—The upstroke of a pumping-engine.
Judd—In whole-working, is a portion of the coal excavated, ready to be brought down.—In pillar-working, is a portion of a pillar of coal in the course of removal.
Jenkin—A lift, or passage driven in a pillar of coals.
Jack-head staple—A small pit in which the feed set for the boilers is generally placed.
Jack-head set—The set of pumps in the jack-head staple.
Jack-roll—A windlass worked by hand.
Jackanapes—Small rollers between the rope-rolls and pulleys on which the rope runs.
Kavels—Lots cast by the men at stated periods for the different working-places.
Kirving—The holing made in the bottom of the coal by the hewer.
Keel—A large river-boat for carrying coals—8 chaldrons.
Keeker—An overlooker.
Kibble—A small rubbish-tub.
Laid out—When a corf or tub contains an excess of small coal or stones, it is forfeited, or laid out, by the hewer.
Landry-box—A box at the top of a set of pumps into which the water is delivered.
Landsale—Coals sold to the country in the neighbourhood of the pit.
Levels—Gutters for the water to run in.
Limmers—The shafts by which the horses draw.
Lining—Dialling, or surveying underground.
Lowe—A light—"piece of lowe"—part of a candle.
Machine—The winding-engine.
Marrow—A partner.
Main engine—The pumping-engine.
Maul—A large hammer.
Metal stone—Argillaceous stone.
Metal rig—The strata forced up by a creep.
Meetings—The middle of a pit or inclined plane.
Mistress—A lantern used by the drivers in the main airways.
Mothergate—The bord along which the coals are trammed from a district of workings.
Mudds—Small nails.
Nicking—The holing made by the hewer in the side of the coal.
Nickings—The small coal worked in forming the nicking.
Off-take-joint—The joint by which the bucket is fastened to the spears or rods.
Off-putter—A man employed in shipping the coals.
Onsetter—The man who sends the coal from the bottom of the pit.
Opencast—An open cutting.
Outset—The height which the top of a pit is raised from the surface, generally from 12 to 20 feet.
Outbye—*Outbyeside*—Nearer to the bottom of the pit.
Overman—An underground overlooker.
Overings—The top framing of a waggon.
Outcrop—When the coal-measures rise up to the surface.
"*Out of the house*"—A pumping-engine is said to go out of the house in the down stroke.

Pair of gears—Two upright props with a cross-piece at the top, for the support of the roof, or for forming wood bridges, staiths, &c.
Parting—An horizontal separation in the coal or stone.
Peck—A measure containing 1,209 cubic inches.
Pinch—A lever.
Pick—An instrument used in working coal, stone, &c.
Plugman—The man in charge of the pumping-engine.
Plug—A circular piece of wood to fill up a borehole, &c.
Plum—Perpendicular.
Post—Sandstone.
Prop—A piece of wood for supporting the roof.
Punch-prop—A short prop.
Putters—Young men who convey the coals from the workings to the horseway.
Pulleys—Wheels over which the pit-ropes run at the top of the pit.
Pulley-frames—Frames for the support of the pulleys.
Ramble—Stone or refuse coal which lies on the top of the coal-seam, and falls down in working the vein.
Renk—The average distance the coals are brought by the putters.
Rests—The machinery at the top and bottom of the pits, on which the shaft carriage is supported during the time of changing the tubs.
Rings—Gutters cut round the shaft to collect the waste water.
Ridding—Clearing away a fall of rubbish.
To ride—To ascend up the pit.
Round coals—Large coals.
Roof—The strata immediately above the coal.
Rope-rolls—The drums on which the ropes of the winding-engine are wound.
Rolleys—Carriages for conveying the tubs or corves underground.
Rolleyway—Underground railway.
Rolleywaymen—Men who lay and repair the rolleyway.
Rusty coals—Coals discoloured by water or exposure to air.
Settle-bords—The platform at the top of the pit.
Screens—Boxes, or spouts placed at an inclination, with longitudinal openings to separate the small coal from the large.
Screener—A man who fills the coals from the screens into the waggons.
Scale of air—A small portion of air abstracted from the main current.
Scars—Clinkers.
Scraper—An instrument for bringing the dust out of the drill-hole.
Seasale—Coals sent by shipping.
Shaft—A pit.
Sheth of bords—A district of workings.
Sheth-door—A door used for ventilating the back workings by coursing the air.
Sheth-stopping—A stopping as above.
Shaft-walls—Strong pillars of coal left near the bottom of the pit.
Shift—The time of working for one day.
Shifter—A man who prepares the working-places at night.
Shear-legs—A wooden framing used for raising weights, boring, &c.
Sheave—A wheel or roller.
Sheaths—The upright framing of a waggon.
Shingley coals—Small pieces of coal but free from dust.

Shot—A charge of powder.
Shifting kavels—The men who are first for removal from one working-place to another.
Siding—A turnout where the empty and full sets pass.
Sleck—Mud deposited by water.
Smart-money—Money paid weekly by the owners to persons who have received an injury in the work.
Snore-holes—The holes in the windbore to admit the water.
Sinker—A man who sinks pits.
Spouts—Boxes down which the coals are run from the waggons into the ships.
Splitting the air—Dividing the air into different portions, each ventilating a separate district of the mine.
Spears—Pumping-rods.
Sneck—A catch to fasten a door, &c.
Soles—The bottom framing of a waggon.
Staith—The shipping-place for the coals.
Staithman—The man who overlooks the shipping of the coals.
Staple—A small pit.
Stay—A support.
Start—The lever of the crab or gin, to which the horse is attached.
Standage—Space for water to accumulate in.
Stemming—The stuff beaten down upon a charge of powder.
Stenton—A passage between two winning headways.
Stenton-wall—The pillar of coal between two winning headways.
Stopping—Walling put into any passage to block it up so as to carry the air forward.
Stonehead—The rock immediately below the alluvial deposit.
Stowing—Rubbish put into old workings to fill them up.
Stowbord—A place into which rubbish is put.
Stythe—Choke-damp or carbonic acid gas.
Sump—The bottom of the pumping-pit.—A catchwater drain.—The part of a judd of coal first brought down.
Sumping-shot—A charge of powder for bringing down the sump, or for blowing the stone up in a sinking-pit.
Swad—A thin layer of stone or refuse coal at the bottom of the coal-seam.
Tail-crab—The capstan on which the spare rope of the crab is wound.
Ten—A measure containing 420 and in other cases 440 bolls, Winchester measure.
Tentale-rents—Rent paid to the lessor at so much per ton.
"*Tear war*"—A signal that men are ready at the bottom to ascend up the pit.
Thill—The floor of the mine.
Towt—A piece of old rope.
Token—A piece of leather with a distinct mark for each hewer, one of which he sends up with each corf or tube.
Trapper—A boy who opens and shuts the air-doors.
Trouble—A dislocation of the strata.
Trimmers—Men who spread the coals in the ship's hold.
Tram—A carriage for carrying the corves or tubs.
Tubs—Boxes for conveying the coals.

Upcast-pit—The pit up which the air ascends after ventilating the mine.
Under the top—In bad roofs where part of the coal is left and cut in the form of an arch.
Underlevel drift—A drift driven from the pumping-pit to un-water dip-workings.
Vend—The whole quantity of coal sent from the colliery.
Viewer—The superintendent of the mine.
Wall—A passage between the bords.
Waste—The old workings.
Wailing—Cleaning the coals.
Waler—Boys who pick the refuse from the good coals.
Waste-boxes—Boxes in which the waste water of the pumping-pit is conveyed from the rings.
Wayleave—Liberty to make a railway over any ground.
Wasteman—A man who looks after the ventilation.
Waiter-on—A man who attends at the top of a sinking-pit.
Waggonwright—A man who makes and repairs the chaldron waggons.
Whin—Any very hard stone.
Winning—A new opening.
Winning headways—Headways driven to explore and open out the coal-seam.
Whole—Where the coal has not been previously worked.
Whimble—A hollow instrument for cleaning the rubbish out of a borehole.
Winding-engine—The engine which draws the coals up the pit.
Windbore—The pump at the bottom of a set of pumps.

NORTHUMBERLAND AND DURHAM.

Acre, statute—4,840 square yards.
Acre, Cheshire—10,240 do.
Adit—Level driven into the mine from the surface.
Adventurer—Coal-miner or lessee.
After-damp—The azotic gas remaining after explosion.
Air current—Volume of air.
Air-pipes or boxes—For exhausting or inserting air.
Air-way—Passage for the air.
Air-pump—For exhausting air.
Air drawing—When the pump draws part air and part water.
Alluvial—The deposit on the rocky strata.
Anthracite Coal—Stone-coal, which yields very little of either smoke or flame.
Available—Capable of being realized.
Azote—Gas inimical to animal life.
Back-shaft—In contradistinction to the coal-drawing shaft.
Back-drift—Ditto to horse-drift.
Bad Air—Adulterated with gas.
Band (black)—Scotch ironstone.
Bands—Layers of shale or sandstone interstratified with the coal.
Band (Heworth)—Peculiar to that locality.
Barrier—Whole coal left at the boundary or between workings.
Barrow—Wheel carriage.
Barrow-way—Tram-road formed with planks.

Basis—The grounds or foundation.
Basonic—Of bason shape.
Beam-spring—Part of the engine-framing.
Bearers—Women who carry coals upon their backs.
Bearing system—The carrying of coals upon the backs of females.
Beater—Part of the blasting apparatus.
Bed—The surface of strata or bottom of walling.
Bind—Sandstone or hard shale.
Balance-weight—To counteract the load.
Baulk—An interruption in the coal.
Bit—A little; a boring implement.
Bituminous—Possessing much bitumen.
Black band—Ironstone abounding in Scotland.
Black damp—Carbonic acid gas.
Black spittle—The product of the lungs in the blind coal collieries.
Blast—Explosion of inflammable air or gunpowder.
Blast (Water)—The rushing out of compressed air through water.
Blasting—Blowing up the coal by means of gunpowder.
Blind Coal—Anthracite coal.
Block—Quantity of coal.
Blower—A violent discharge of gas from an orifice in the stone or coal.
Board-end door—Used for ventilating that single place.
Boll—A customary coal measure, 9,678 cubic inches.
Bolt-hole—For circulating air.
Bore-hole—To ascertain the strata.
Bore-rods—To perforate the strata.
Bottom board—For discharging at the bottom of the waggon.
Boundary—The division between properties.
Bovey Coal—A species of lignite, or charred wood.
Brace head—A boring implement.
Brake—For retarding machinery; a boring implement.
Brattice—A wooden partition for conveying air.
Breeding Fire—Spontaneous ignition from small coals.
Breach—Breaking through.
Breaker—One of the colliers who wedges down the coal.
Broad gate—A main working.
Broad wall—The taking away of all the coal; long wall.
Brushing—A violent motion to remove the gas.
Bucket—Part of the pump apparatus.
Bucket-tree—The pump to which the bucket-door is attached.
Bunting—Beam across the shaft.
Burner—That part of the lamp which contains the wick.
Butty collier—A contractor for working and conveying the coal.
Cabin—A hut or hovel.
Cage—A frame for containing the tubs where conductors are used.
Calcination—Roasting coal or ironstone.
Cannel coal—Remarkable for its illuminating power.
Carboniferous—Strata containing coal.
Carbonized—Coal coked.
Catch-pin—Attached to pumping-beam.
Catrake—Apparatus for regulating the speed of the engine.
Certain rent—Fixed rent; farm.

Char—Coke.

Chain-pump—Worked with an endless chain, fitted up with leather buckets fitting the pump; as the chain revolves over a wheel, each bucket delivers a quantity of water.

Chalk—Carbonate of lime.

Channel—A grove or space.

Chingle—Small coal.

Chisel—A boring instrument.

Chink—An opening in the strata.

Chirt—Strata similar to flint, accompanying lead strata.

Choke damp—Carbonic acid gas, inimical to animal life.

Cinder-coal—Coke.

Circumferenter—Miners' compass.

Cistern—For containing water.

Clack—A valve at the bottom of the pumps.

Clack door—Attached to ditto for changing.

Clack-piece—The pump in which the clack is fixed.

Clams—Screw hoops around the pumps.

Cleading—Deals nailed on to the buntings.

Clean coal—Unmixed with band or refuse.

Clearer—The collier who holes under the coal.

Cleavage—Fracture of the coal.

Cliffes hook—Used in sinking.

Clunch—A soft white substance like pipe-clay.

Coal-seam—Bed of coal.

Coal-bason—The general form of coal-fields.

Coke—Calcined coal.

Collarings—Cross timbers to steady the pumps.

Collier—The worker of coal.

Colliery—Establishment for raising coal.

Communications—Holings in the wall.

Column of air—Air-current.

Column of pumps—Set of pumps.

Compass—Circumferenter; surveying instrument.

Conductors—Guides for the cage, fixed in the shaft, and constructed of wood or iron.

Concession—Belgian term for lease.

Corf—Wicker basket for containing coals.

Courses—Tiers of wood or iron.

Courses (Air)—Passages for the air.

Coursing—Carrying the air through the workings.

Counter-balance—A counteracting weight in machinery.

Crack—Crevice.

Crank—Force-pump driven by horses or steam to force the water up from the dip.

Crab—Windlass worked by horses. Varieties: main-crab, ground-crab, tail-crab.

Crab-rope—For lifting the pumps, &c.

Cradle—A wooden seat attached to a rope, for working in the shaft.

Crane-place—The depôt where the coals are transferred from the trams to the rolleys.

Creel—The basket used by a bearer-woman to carry coals.

Creep—The movement of the stratification where the pillars are left too weak, or where the floor is very soft.
Crossing—Where one column of air is made to cross over another.
Crow-coal—The uppermost seam.
Crush—The strata affected by intense pressure; creep.
Cuffat—The tub used for drawing the coals in Belgium.
Curb—Ring of wood or iron fixed in the shaft. Varieties: wedging, spiking.
Dart—The direction of the air-current in drawings.
Dam—An artificial building for the stoppage of air or water. Varieties: clay, stone, timber, iron.
Davy lamp—After the inventor, Sir H. Davy; safety-lamp.
Debris—The refuse of the mine; outcrop of seam.
Dial—Miners' compass.
Diagonally—A working pointing in a direction between dip and rise.
Dip—The lower level of a coal-mine.
Dislocation—Where one part of the strata has been severed from the other; a dyke or trouble.
District—Part of a mining-field.
Doggy—The deputy of the butty collier.
Doors, for checking the air—Varieties: single, double, sheth, board end, and brattice.
Downcast—The current of air downwards.
Draft—The artificial impulse given to the air.
Drainage—The abstraction of the water of the mine.
Drawdown—Downcast.
Drift—Passage excavated in the mine.
Drift (dumb)—Passage allotted to the foul air.
Drill—Implement for boring, sinking, or blasting.
Drowned—Workings filled with water.
Dyke—Interruption in the coal-mine. Varieties: clay, flat, slip, whin.
Dyke (upcast)—Where the coal, on approaching the dyke, is thrown upwards; and, *vice versâ*, downcast.
Edge seams—Seams which lie at an angle exceeding 40 deg. are called edge seams.
Engine (winding)—For drawing coal.
Engine (pumping)—For drawing water.
Eudiometer—Apparatus for measuring the velocity of the air.
Explosions (general)—Where considerable quantities of gas explode.
Face airing—The current passed round the extremity of the workings.
Fall—When the roof stone gives way.
Fan-blast—A means of propelling the air-current by the revolutions of a machine.
Fathom—A measure, 6 feet.
Fault—Interruption of coal, dyke, trouble.
Feeders (partial)—Temporary springs of water.
Feeders (general)—Ditto, which remain permanent.
Fighting of pits—The deviation of the air-current between downcast and upcast.
Fire-damp—Carburetted hydrogen gas.
Fire (partial)—Common occurrence.
Fire (breeding)—Produced by accumulation of small coals.

Fire-rib—Barrier of coal for the insertion of dams.
Fire (*standing*)—When the coal or gas remains seriously ignited.
Fiery mines—Producing much gas.
Fire-clay—Shale which withstands fire, produces fire-bricks.
Fish-head—An implement used for drawing clacks.
Fissure—The fracture of the strata at a fault, or otherwise.
Filler—The collier who fills the coal-tubs.
Five-folds—A set of sheaves for multiplying power for the lifting of pumps, &c.
Flat seams—In contradistinction to edge seams.
Flakes—Sheets of vapour nearly inflammable.
Floor—The strata whereon the coal rests.
Flue—Horizontal chimney.
Footage—Rent payable by the foot thick per acre.
Forewinning—Previous advanced workings.
Foul—Contaminated with gas.
Formation—The form or deposition of strata.
Forcing set—The water forced up by a solid piston, instead of the ordinary pump and bucket.
Fossil—Alluvial substance now mineralized.
Franc—French coin, 10*d.*
Funnel—Erection for receiving or discharging the air.
Furnace—Large fire either employed for ventilation or otherwise.
Fuze (*patent*)—For communicating a light to gunpowder in blasting.
Gag—Obstruction in the bucket or clack.
Gang—A company of workmen.
Gallery—Passage in the mine.
Gangway—Artificial road constructed of timber.
Gate-road—Horse-road.
Gear—Utensils used in mining or machinery.
Geological—Appertaining to the earth.
Gin (*common*)—For drawing coals by horse-power.
Gin (*cog and rung*)—The ancient gin for drawing coals.
Gin (*jack*)—Especially used for working in the engine-shaft.
Goaf—A hollow.
Goaves—Plural of goaf.
Gob—The part excavated, goaf.
Gravel-bed—A wash of sand and gravel found many fathoms under the surface.
Greenstone—Whin, basalt.
Grit—A rough coarse sandstone.
Ground-spears—Applied to the hanging of pumps.
Ground-ropes—Belonging to the five-fold sheaves for do.
Growth of water—Springs of water.
Gubbin—A species of ironstone in Staffordshire, found in disconnected rounded masses.
Headways—Exploring-drifts.
Heapstead—The elevation of the shaft above the surface for skreens, &c.
Hitch—A minor fault in which the coal has been severed, not exceeding the thickness of the seam.
Hogger-pump—The top pump, furnished with leather bag to connect the delivery of water with the cistern.

Hollow—Gob, goaf.
Hopper—A chest or receptacle for small coals.
Horse-gate—Rolley-way.
Hostmen—A chartered company of merchants for carrying on the coal trade of Newcastle-upon-Tyne.
In-by—Those portions of the workings beyond the crane or depôt.
Inlet—Passage into the mine, downcast.
Inferior—Lying under level or below the other parts.
Intersected—Cut across.
Inclined plane—Artificial arrangement for lowering or hoisting the produce of the mine.
Intake—The passage which conveys the air inwards.
Ignite—The act of taking fire.
Incombustible—Incapable of being burnt.
Ironstone—The raw material, stone of which iron is made.
Jack-roll—Hand windlass.
Jack-rope—Attached to jack-gin.
Jigg-brow—Inclined plane.
Keel—A barge for conveying coals.
King-post—Apparatus for strengthening the beam.
Laminated—Constructed in layers.
Lamp—For rarefying, safety-lamp.
Lap—The part whereon the rope coils.
Lessee—The tenant.
Lessor—The landlord.
Level (*horizontal*)—Neither dip nor rise.
Level (*free*)—Discharging at the surface without engine-power.
Lift—A column of pumps.
Lifting-pump—Common pump.
Lodge—A temporary hut for sinkers.
Long wall—The taking away of all the coal by first process, in contradistinction to pillar and stall.
Man of war pillars—Principal support in the thick-coal workings.
Marl—A species of fire-clay in connexion with magnesian limestone and turf.
Maul—Used in sinking and coal-working.
Metre—French measure of 37·39 inches.
Mountain limestone—Blue, and in contradistinction to the magnesian.
Naked candle—Unenclosed.
Nip—An irregularity or thinning in the seam of coal.
Nook—Angle.
Offtake joint—For convenience of disjoining.
Opening—Excavation.
Orrell coal—Lancashire, celebrated for its superiority.
Outcrop—Where the seams appear at the surface.
Outlet—Escape, egress.
Out-by—The roadways between the crane and the shaft.
Outfittings—Appendages.
Overlap—Two seams coming in close contact with each other.
Overman—The daily manager of the pit.
  Do. (*deputy*)—Assistant.
Pannel working—Working by divisions.

Parrot coal—The celebrated gas-coal of Scotland.
Passage—A holing or communication.
Piles—Planks, the ends of which are armed with iron for penetrating sand.
Pillar—Block of coal.
Piping—Conveyance of gas through pipes.
Piston—The moveable part within the pump.
Pitman—Collier.
Pit candle—Purposely small, viz. 30 or 40 to the lb.
Plank (*pit*)—For supporting the loose stone.
Plate—A species of shale.
Plunger—Used in forcing water.
Porous—Open.
Pricker—An implement used in blasting.
Prop—Timber for supporting the roof.
Puddle—Liquefied clay or soil.
Pump-rod—Attached to the bucket.
Putter—One who conducts the tub or basket of coals from the hewer.
Pyrites—Sulphate of iron.
Quadrant—Temporary pumping-beam at pit top.
Quarter—The fourth part of a yard = 9 inches, a term applied to the thickness of coal.
Quicksand—Fine sand so mixed with water as to render it fluid.
Ram—The plunger of a forcing set of pumps.
Rarefy—To heat air to produce expansion.
Reek—Smoke.
Rent (*certain*)—Fixed, farm.
Rent (*royalty*)—Payable by the ton.
Rest—A boring implement.
Return air—After it has traversed the workings.
Rib-fire—Coal barrier for insertion of a dam.
Ring—Applied to the skips of Staffordshire, also the horizontal groove formed in the shaft for the collection of the water.
Rise—The upper plane of the coal-bed, in contradistinction to dip.
Robbing—Cutting away part of the pillars.
Roll—An excrescence of the roof or floor of the mine.
Roll-rope—The drum upon which the rope laps.
Rolley (*out-by*)—The wheel-carriage and horse-road into the mine.
Rolley (*in-by*)—The horse-carriage used between the crane and the workings.
Rolley-way—Edge railway, in contradistinction to tram-way.
Roof—The strata immediately resting upon the coal.
Royalty—Mine rent, tonnage.
Rubbish—The debris, waste.
Runner—A boring implement.
Sandstone—Silicious strata.
Scaffold—A wooden platform fixed across the shaft.
Scraper—A blasting implement.
Section—Profile of the strata.
Set (*standing*)—Fixed in a cistern at the bottom of pit.
Set (*hanging*)—Pumps hung upon chains or ropes.
Shaft—Pit, round or square; rope-roll shaft.

Shale—Strata without mixture of silica.
Shear-legs—Tall framing above the engine-pit.
Sheave—Pulley.
Sheathing—Thin deal applied to the joints of tubbing.
Sheth-door—Or stopping to guide the main air-current.
Shorts—Prepaid rents for which coals are allowed to be worked.
Side-lane—A process in the thick coal, preparatory working.
Siding—Railway pass-by.
Silicious—Containing silex.
Sinker—The person who sinks shafts.
Skip—Frame used in Staffordshire in drawing the coals.
Skeleton-plan—Confined to the illustration of a certain subject.
Skreen—Apparatus for separating the small coal from the large.
Slack—Small coal.
Sledge—Wooden frame whereon to convey the coal.
Sleeper—On which the railway is fixed.
Sliver—Wood or iron between the joints of planks to render them air-tight.
Slot—A bolt or fastening.
Small coal—That passed through a skreen or riddle.
Smelting—The melting of iron from the raw material.
Snore-holes—For admitting water into the windbore of pumps.
Sooty—The produce of coal from attrition, the appearance at the out-crop.
Sorting—Separation, classification.
Spanner—Part of the working gear of engine.
Spare—A wedge used in the construction of tubbing.
Spigot and Fawcett—One part of a pipe going within the other.
Spiral—The centrifugal ventilator of Belgium.
Spontaneous combustion—Ignition from the decomposition of coal pyrites, &c.
Splint-coal—Grey laminated open-burning steam-coal.
Splitting—Subdividing.
Stair—The ladder or circular apparatus for ascending and descending the Scotch coal-pits.
Staith—Building wherein to deposit coal for future removal.
Stall—Excavation, bord, wicket.
Stamper—For forcing soft stone into the drill-hole.
Standage—Space for retaining water.
Staple—A minor shaft sunk from seam to seam.
Start—The arm of the gin.
Steam-coal—Open-burning coal, splint, coal that will not cake.
Steel-mill—The substitute for a candle before the invention of the safety-lamp.
Stem—To stuff the drill-hole with soft material.
Stenting—A holing between the pair of exploring drifts or headways.
Stithe—Carbonic acid gas.
Stone-coal—Anthracite.
Stone-head—Top of strata.
Stopper—Apparatus attached to the skreen for saving the breakage of coals.
Stopping—To guide the air-current.

Stowing—The artificial pillaring up of excavation.
Streak—Imaginary level line, water-level.
Sumerge—To rise up from below.
Sulphur—Inflammable or other noxious gas.
Sump—That part of a shaft sunk below the coal for standage.
Superior—Lying above.
Surveyor—The surveyor and planner of the workings.
Sweep—The oar used at the stern of the coal keel.
Synopsis—Summary view.
Taille—Board, wicket, Belgian.
Tapping—The draining or drawing off.
Thill—The stratum upon which the coal rests.
Throw—The effect of slip-dykes, by which one part of the strata is left above the other.
Thrust—Where the pillars are taken away, and the mine is left a mass of ruin.
Timbering—Composed of curbs, planks, &c.
Tomahawk—An implement used in sinking.
Tonnage—Computing by the ton.
Topit—An implement used in boring.
Trail—To draw.
Tram—A slight wheel-carriage for conveying the tub or basket.
Tram-way—Rectangular plates of iron constructed for trams with sharp wheels.
Trap-door—For checking the air-current.
Trapper—The person who attends the trap-door.
Travel—The traversing of the air-courses.
Trouble—Interruption in the coal, fault, dyke.
Trying the candle—Judging by its appearance as to the state of the air.
Tub—For drawing water.
Tubbing—For stopping water, constructed of wood, stone, or metal.
Tube—A chimney for the purpose of ventilation.
Under-viewer—The resident or deputy viewer.
Ungearing—Disconnecting machinery.
Upcast—The shaft which discharges the air from the mine.
Valve—For opening or shutting off air, steam, or water.
V-bob—A diagonal movement for pumping.
Viewer—The manager of a colliery.
Vis inertiæ—A dead weight, gravity.
Waggon-way—Railway.
Wain—The cart used for conveying coals previous to the introduction of railways.
Walling—Building of brick or stone.
Wash—Formation of sand and gravel.
Waste—Old workings.
Water-blast—Compressed air forcing up water.
Waterfall—Stream of water falling down the shaft.
Water-level—Neither dip nor rise.
Water-tight—Impassable to water.
Wayleave—Right of passage.
Wedging out—The thinning of strata.
Wilon—Basalt, greenstone.

While coal—Before any coal is worked.
Wildfire—Inflammable air.
Wimble—An implement used in boring.
Windgate—Air-passage.
Winding-shaft—Where the coals are drawn.
Windlass—Jack-roll, crab, or other purchase.
Winning—Exploring, the process of establishing a colliery.
Wire-gauze—The constituent of the safety-lamp.
Witchets—A wicket, board, stall.
Workable—Seams sufficiently thick to be worked to a profit.
Working-barrel—The pump whereon the bucket hooks.
Workings—The excavations of a colliery.

SPAIN.

Abra—A fissure, a considerable opening or cavity in the mountain, rock, or lode.
Abronzado—Yellow copper ore, sulphuret of copper.
Acarreadores—Wood carriers.
Acero—Steel.
Achicar—To decrease, to diminish; applied to the diminution of water in any of the workings, lowering the water in shafts, &c.
Achicadores—Workmen employed in removing the water in *botas*.
Acuna—Die for coining.
Acunacion—Coining.
Acunador—One who coins.
Acunar—To coin.
Ademador—A mining carpenter; a timber-man.
Ademar—To timber.
Ademe—Timber-work for supporting and securing the works of the mine.
Adobes—Unburnt bricks made of straw, earth, and dung, dried in the sun.
Adminstrador—Superintendent.
Administracion—Administration, management.
Afinacion—Refining.
Agata—Agate.
Aguafuerte—Aquafortis, nitrous, or nitric acid.
Ahondar—To sink, to deepen.
Ahonde—Sinking or driving downwards.
Alabastro—Alabaster.
Albanil—Mason, bricklayer.
Albaradon—A dyke.
Albayalde—White lead.
Albergue—A natural hollow, a den.
Alcohol—Galena, sulphuret of lead.
Alcribis o Tovera—The tuyere of a smelting-furnace.
Alear—To alloy metals.

Aleacion—The art of alloying metals.
Alhondiga—Corn-market or public granary.
Alimentos—In mining, an allowance to mine-owners, as subsistence, until their mines become profitable.
Almacen—A store-house, store-room, warehouse
Almadeneta—A stamp-head.
Almagra—Ruddle, red ochre.
Almud—Twelfth part of a fanega.
Alquifol—Galena.
Alquilar—To hire.
Alto—The upper part.
Alumbre—Alum.
Ambar—Amber.
Amatista—Amethyst.
Amianto—Amianthus.
Amoldar—To mould.
Amonedar—To coin.
Amparo—The maintenance of the legal right of ownership by continued possession. In mining, this can only be preserved by keeping a certain number of men at work at certain periods, as determined by the mining code.
Anchura—Width, roominess.
Angulo—An angle, a corner.
Antimonio—Antimony.
Aparejo—A tackle, a block and fall, an apparatus; a set of harness for beasts of burden or draft; a pack-saddle.
Apartado—Establishment for parting silver and gold.
Aperos—Utensils; also materials, such as gunpowder and paper for blasting, &c.
A pique—Trabajar a pique—Digging downwards in a vertical direction.
Apolvillados—Rich ores.
Apuradores—Men who rewash the earth from the tinas.
Arcilla—Clay.
Arena—Sand.
Arenilla—Fine sand.
Arrastrar—Applied to where veins unite and form one; to drag.
Arrastre—Mill for grinding ores, employed in the process of amalgamation of silver ores and of gold.
Arreador—Horse-driver for malacates.
Arroba—25 lbs. Spanish weight.
Arriero—A muleteer.
Arsenico—Arsenic.
Asbesto—Asbestus.
Aserrador—A sawyer.
Aserrar—To saw.
Asfalto—Asphaltum.
Astillero—Open forest, pasture for mules, &c.
Atacadera—A rammer.
Atacador—Rod for ramming in the charges for blasting.
Atajador—A boy who attends the horses and mules.
Atajo abierto—Applied to a mine when worked in the manner of a quarry, or by an open cut in a rock or mountain.

Atargea—Water-courses of masonry.
Atecas—Labourers who collect the water in buckets from the planes of the mines, in order to pass it off by the shafts ; also, men who fill the skins in the shafts with water, mud, &c.
Atierres—Attle, rubbish ; in the mine, earth preventing the continuation of the work.
Atisador—A stoker, man who attends the furnace.
Audiencia—Principal tribunal of justice.
Aviado—The mine-owner supplied with funds for working his mines.
Aviador—He who supplies funds for working mines.
Avio—Funds advanced for working mines.
Avios—Implements.
Ayudante—Assistant.
Azabache—Jet.
Azanca—A leat.
Azarcon—Red lead.
Azogue—Quicksilver ; silver ore adapted for amalgamation.
Azogue apolvillado—Very good ore for ditto.
Azogue common—Common ore for ditto.
Azogue ordinario—Ordinary ore for ditto.
Azogue razonable—Middling ore for ditto.
Azogue en caldo—Quicksilver.
Azogueria—The ware-room, in which quicksilver is kept in store.
Azoguero—An amalgamator ; person who superintends the process of amalgamation.
Azufre—Sulphur.
Azufre vivo—Native sulphur.
Bancos—Rocks, which intercept the vein, or cause it to take a different direction.
Banquillos—Stools on which the marquetas are placed.
Bano—The last portion of quicksilver applied to a torta.
Barquina—A large furnace.
Barquines—Forge bellows.
Barra—A bar, an iron crow ; equal shares into which the interest in a mine is divided, usually 24 in number.
Barra de plata—A bar of silver, usually about 135 marcs, or 1,080 oz.
Barranca—A ravine.
Barrena—A drill or borer used in blasting.
Barrenadores—Miners who work with the borer and mallet.
Barrenar—To bore.
Barrenero—A boy who attends with the boring-tools.
Barrenos—Holes made for blasting.
Barreta—A miner's bar or crow.
Barreteros—Miners who work with crow-bars, wedges, or pick.
Barro—Clay, loam, mud.
Basalto—Basalt.
Batea, or Apuradera—A bowl used in rewashing.
Baxo—Beneath, low, lower part.
Beneficiar—To extract the metal from the ore ; to dress ore.
Beneficio—Making the metallic contents of the ore available by reduction.
Beneficio de cazo—Reduction of ore by amalgamation, conducted in a copper pan over a fire ; hot amalgamation.

Beneficio de hierro—Reduction of ore by amalgamation, with the addition of fragments of iron.
Beneficio de patio—Reduction of ore by amalgamation, in sheds or open court-yards.
Beneficio de pella de plata—Applied when a portion of amalgam of silver is added to the mass under amalgamation.
Beneficio de la colpa—A method of amalgamation, in which, instead of *magistral*, *colpa* (colcothar) is used.
Beneficio por fuego—Reduction of ore by smelting.
Berilo—Beryl.
Bigorneta—A small anvil.
Bigornia—An anvil.
Bismut—Bismuth.
Blandura—Soft, crumbly ground.
Blenda—Blende, sulphuret of zinc.
Boca—Mouth, entrance, or pit of a mine; first opening made in the vein.
Boca mejora—A shaft or boca to communicate with the entrance of the vein to facilitate the workings.
Bochorno—Vapour, or foul air; want of ventilation; suffocating heat.
Boletas—Tickets of sale of ores; cheque tickets; account of charges, and produce of one amalgamation operation.
Bolsa—A purse; sometimes applied to a bunch of good ore of the supposed shape of a full purse or bag.
Bomba—A pump.
Bonanza—Prosperity; fine weather. A mine in *bonanza* is in a prosperous state; stopping costs, yielding profit.
Bordes—Border; ore left untouched by previous working in an old mine-work.
Bordeta—A small pillar.
Borrasca—Adversity; foul weather. A mine in *borrasca* is in an unproductive state; does not stop costs.
Bota—A leather bag or sack, made of one or more ox-skins, in which water is lifted in the mines.
Bota chica—Small leather bag.
Bota grande—Sack made of 2 or 2½ hides, used to extract water, and worked by horse-whims.
Botilla de burro—Sack, or bag, made of one neat hide, to extract water, and worked by a burro or hand-whim.
Botilla de lomo—Small sack made of one-third of a hide, to carry water out of small sinkings on men's backs.
Boveda—Vault, arch.
Braceage—Brassage in coining.
Broculas—Drills.
Bronce—Brass; gun-metal; iron pyrites.
Buytron—Furnace for smelting ores.
Burilada—A chip taken from a mass of silver to try whether it be standard.
Burro—A hand-whim; a windlass.
Busca—(Search.) The right to employ *buscones* frequently claimed by the administration and persons employed in mines.
Buscones—Tributors or miners who work on part proceeds; also, those

who search for ores in a metalliferous district generally, or in a mine for such ores as may have been neglected, and left behind by others.
Caballerangos—Horsekeepers.
Caballitos—Men who carry the mining captains or others.
Caballo—A horse; a mass of the steril mountain rock immersed in the lode.
Caballo de tepatate—A mass of barren rock interposed in a vein.
Cadena—A chain.
Cajon—In Peru and Chili, two montons of 32 quintals each, 64 quintals.
Cajon de Granza—The pit to receive the crushed ore.
Cajonero—A lander, or one who receives the bota or manta at the shaft's mouth.
Cal—Lime.
Calde Estano—Calx of tin.
Calderas—Boilers.
Calentadura—The first heating of the furnace, or putting the furnace into blast.
Caliche—Calcareous matters; ores of a calcareous character.
Calicheros—Lime-burners.
Calientes—Warm ores (in amalgamation) containing sulphuret of iron and copper, and no calcareous matter.
Caliza, or Cal en piedra—Limestone.
Cal viva—Quicklime.
Campistas—Tributors.
Campo—A pitch, a working in possession of buscones, or allotted to the proprietors or others.
Canal—A spout; a canal.
Candallero—A socket deeper than the chumacera, and used for the same purpose.
Canella—Used to convey the fire to the charge for blasting.
Canon—In a mine, a level, or horizontal gallery.
Canos—Pipes, tubes.
Cantera—A quarry.
Cantero—Stonemason; quarryman; a pitcher.
Caparossa—The person in charge of the sheds under which the tahonas are worked.
Capellinas—Large iron or copper bells, under which the quicksilver is separated from the silver in the amalgam by distillation.
Carbon—Coal; charcoal.
Carbon de lena—Charcoal.
Carbon de piedra, or Carbon de tierra—Pit coal.
Carboneros—Carriers, makers, and sellers of charcoal.
Carcamo—The drain which carries off the earthy matter from the tinas when washing the amalgam.
Cardenillo—Verdigris.
Carena—An upright stanchion for supporting machinery.
Carga—380 lbs. Spanish; a mule-load, varying in the different mining districts; a charge for blasting; a lode.
Carpintero—A carpenter.
Carilleros—Ore-carriers.
Carretilla de mame—A wheelbarrow.
Carrita—A waggon or cart.

Carritero—A waggoner.
Casa de moneda—The mint.
Cascajal—A gravel-pit.
Cascajo—Gravel, rubbish.
Caso—A boiler used in hot amalgamation.
Castillo—The frame of the stamping-machine.
Castina—Fluor or flux.
Cata—A mine of no great depth; a pit made in quest of the vein; a mine denounced for trial.
Catear—To search for new mines.
Catero—A searcher for mines.
Caxa—Money chest; treasury.
Caxa del tiro—Reservoir at the bottom of the shaft; sump of the pit; that part of the pit below the deepest level driven from it.
Caxo—A measure of ore containing many quintals, but varying in bulk at different places; at Potosi, 5,000 lbs.; a handbarrow.
Caxoneros—Landers at the mouth of a shaft.
Cebar—To feed; to supply a furnace with materials for smelting; to add quicksilver to a mass of ores under amalgamation.
Cebo—Priming, as of gunpowder; a feed, as oats for horse; second addition of quicksilver to the torta.
Cedazos—Sieves.
Cendrada—The bottom of the refining or cupelling furnaces, made of very fine earth and vegetable ashes which have been lixiviated; materials of which a cupelling test is made; the test itself.
Cendradilla ò Galeme—Cupelo.
Cerro—A mountain.
Cestas—Baskets.
Chapas—Iron blocks on which the stamps fall.
Charqueadores—Cart-fillers.
Charqueo—Filling the baskets by hand.
Chichicles—Crystallized calcareous or other spar.
Chicuites—Baskets.
Chiflon—*Trabajar chiflon*—A phrase, meaning the work making way, both in length and depth.
Chino—Iron or copper pyrites.
Chumacerá—An iron socket for the sockets of shafts.
Cielo—Roof of a work, an upward working. *Trabajar de cielo*, working at the roof or top of the vein.
Cilindro—A cylinder.
Cinabrio—Cinnabar; sulphurate of mercury.
Claro—An open space on the lode from which ore has been taken.
Clavos—Masses of native metal, bunches or masses of ore; nails.
Cobalto—Cobalt.
Cobre—Copper.
Cobre en roseta—Rose copper.
Cobriso—An inferior kind of copper ore.
Colero—Assistant of the underground captain in charge of the peonada, or account of the daily labour.
Cohete—A cartridge for blasting.
Collado—A hill.
Colorados—Ores coloured with red oxide of iron.—See *Pacos*.

Comillo—A reverbatory furnace.
Comer los pilares—To take away the pillars of the lode which had been left during the previous working of the mine to support the roof, and consequently to abandon the mine.
Comerse los pilares—The same as *comer los pilares*, figuratively, to abandon a mine.
Compromiso—A private engagement or undertaking; also a joint-stock undertaking.
Conducta—A convoy or caravan, conveying the precious metals or coin overland.
Contra cielo—A rise or working upwards.
Contra mina—A work of communication between two mines; also an adit.
Convenio—A legal agreement.
Contra tiro—Auxiliary pit contiguous to a main pit or shaft, to serve as a footway, or for ventilation.
Copola—A cupelling-furnace.
Copos, or Paxillas—In amalgamation, little globules into which the quicksilver forms, when the process is too quick.
Coral—Copper.
Cortar Pilar—To complete the pillar, and make a cross passage, and to form a landing-place.
Cortar las sogas—To abandon a mine; lit. to cut the ropes.
Costadores—Wood-cutters.
Costal—Sack for ore, made of the *pita* or thread of the aloe; a rammer or beetle.
Cras—An iron cage or frame used in smelting.
Creston—Out-cropping of a lode; the crest of a lode appearing above the surface of the ground.
Criadero—A spot which is metalliferous; a spot; a district; a mountain; a rock where ores are supposed to grow.
Criba—Perforated leather, through which the stamped ore falls into a pit.
Crisolito—Chrysolite.
Cristal—Crystal.
Cristal de roca—Rock crystal.
Crucero—A cross-cut.
Cruces—The cross-pieces of the arrastres, or grinding-mills.
Cruzada—Applied to lodes, that which is crossed by another.
Cubo—A leather or other bucket.
Cuchara—The scraper used for extracting the pulverized ore or rock in the hole made to receive the charge for blasting; a spoon.
Cuchara de cuerno—A small horn bowl in which the earth of the tortas is washed, in order to ascertain from time to time the progress of the amalgamation.
Cuele—The art or effect of cutting or driving a mine; work in any direction; the distance or space advanced in a mining work.
Cuerda—A rope.
Cueros—Skins, generally of oxen, cows, &c.
Cuna—A wedge.
Curtir—The operation of adding lime to warm ores, or magistral to cold ores in amalgamation.

Cuerpo—The lode; also body, as *cuerpo de la veta*, body, or main vein of the lode.

Cuerpo alto—Upper branch of the lode; upper story of a house or store.

Cuerpo baxo—Lower branch of ditto; ground-floor of ditto.

Cuerpo medio—Middle branch of ditto.

These three terms are used where a lode is divided into three parallel branches with the same underlay, as at Veta Grande, Guanaxuato.

Dedo—The 12th part of a palmo; 4 palmos making 1 vara—12 dedos—8 pulgadas, or Spanish inches.

Demasia—Space unappropriated between mines, or otherwise.

Denuncio—*Denunciacion*—Denouncement; a formal application to the court of mines of the district, to have a mine adjudged to the applicant, the workings of which have been abandoned, or inefficiently carried on during the period fixed by the ordinance, or which has never been worked at all. A person has the power of denouncing a mine which has been unworked, or inefficiently worked, or depopulated for more than four months.

Deputacion de mineria—Mining tribunal.

Derecho—Straight, right.

Derrumbe, or Derrumbamiento—The falling in of the works of a mine.

Desaguador—Water-pipe or conduit.

Desagüe—Drainage.

Desagües—Outlets of every description by which the water is got rid of.

Descargue—Drawing off the last contents of the furnace, blowing out the furnace.

Descostradores—Men employed in taking down any fragment which may remain after blasting.

Descubridora (*mina*)—The mine in which the vein has been discovered, and which is entitled by law to a double *pertenencia* if in a district already worked, or a treble *pertenencia* if in a new district.

Desfrutar—To enjoy, to have the benefit of a mine.

Desmonte—Clearing away the surface of the ground; removing by the pick, blasting, or otherwise, the mountain rock, or breaking down ores.

Despacho—Plat; point of junction between a shaft and a level enlarged for receiving the ores, &c. to be sent up the shaft to the surface.

Despachadores—Men employed in filling the *mantas* with ores, &c.

Despensa—A store-room for materials and tools, sometimes also for the quicksilver, and even for the bullion.

Despueble—Abandoning the mine, or omitting to keep the proper number of hands at work.

Destajo—Piece or contract work; tut-work.

Destajero—Tut workman, or one who undertakes to work by contract.

Diamante—Diamond.

Dique—A dyke.

Echadero—A plain where mules are loaded, the metal spread out, cleaned, and weighed.

Echado—Inclination, or dip of the slope.

Ege—The axis of a wheel, axis of a carriage, &c.

Embolo—A piston.

Emborrascarse—Applied to a vein which has become barren as the spot then in work.

Emparejar—To level or square; to harness cattle, saddle them.
Empleo—The quantity of quicksilver mixed with the ore on any given occasion for effecting the amalgamation.
En bonanza—Yielding profitable returns.
Encampanar una mina—To cut off the workings of a mine on the underlay by working on the lowest works from the neighbouring mine.
Encapillar—To form a chamber, or an enlargement of a working, preparatory to driving another work from it.
En frutos—In produce, producing ores.
Ensalmorar—The first process in amalgamation, the act of mixing the saltierra with the lama.
Ensayador—Assayer.
Ensaye—An assay.
Ensayo—A trial.
Escaleras—Ladders made of poles of timber, with notches cut in them, or otherwise.
Esmanil—Blende.
Esmeralda—Emerald.
Esmeril—Emery.
Espato—Spar.
Espato calizo—Calcareous spar.
Espato fluor—Fluor spar.
Espato pesado—Heavy spar; sulphate of lime.
Espejuelo—Mica.
Espeque—The cross-level of the noria or tahona to which the mules are harnessed; a lever.
Estaca fixa—The post driven into the ground, from which the pertenencia is originally measured. *Estaca* means a stake.
Estado—A statement or account.
Estano—Tin.
Estanque—Pond, dam of water.
Estoraque—Brown blende, sulphuretted zinc.
Faenas—Work done by common labourers, such as dead-work, removing rubbish, &c.
Faenero—Rubbish-carrier.
Fanega—A dry measure, containing 12 celamines, or 1·599 of an English bushel.
Fanegado—An extent of land; $90\frac{1}{3}$ fenegados are equal to 100 English acres.
Feldespato—Feldspar.
Fierros—Stein, vulgarly regulus, from the smelting-furnace.
Flete—Freight.
Fluorspato—Fluor spar.
Fluxo—Flux.
Fondon—A furnace for smelting ores.
Fosforo—Phosphorus.
Fosiles—Fossils.
Fragua—A forge.
Frios—In amalgamation, cold ores, those containing calcareous matter, therefore requiring a larger quantity of sulphuric acid from the magistral.
Frente—An end; a forehead; an extremity of an adit or other level.

Frijolillo—A breccia.
Frixoles—French beans, the common food of the country.
Frutos—Produce, ore.
Fuelles—Bellows.
Fundidor—A founder, a smelter.
Fundicion—Smelting; also, the smelting-house.
Galena—Galena, sulphuret of lead.
Galera—A large shed, a mill-house, or grinding-mill; a large building on the floor of which the treading-in of the quicksilver in amalgamation takes place.
Galleria—A gallery; a level.
Gallos—Small particles of silver, which appear in the shape of spherules on the surface of certain ores, after they have been strongly heated; more generally, however, applied to the spirting out of the silver from the assay-button on cooling; also fine specimens of native silver, or other rich ores.
Gamela—A large wooden bowl.
Galpeador—A miner who works with the mallet or hammer in blasting.
Granada—Garnet.
Granito—Granite.
Grano—A grain.
Granos de oro—Grains of gold.
Granza—Coarse particles of ore after grinding, which require to be ground again; brayed ore.
Granzas—Poor ores.
Grasas—Slag from the smelting-furnace.
Greda—Chalk.
Grena—Ores in the rough state, not cleaned.
Greta—Litharge, fullers'-earth.
Gualdra—The large cross-beam in which the upper spindles of the shafts of the machinery traverse.
Guarda—A rib of different substance from the rock or lode, which generally is upon the sides of the vein, called in Cornwall cupels of a lode or backs.
Guarda raya—Marks or limits of the boring, or measurement of the work done in a mine; limit or boundary-line.
Guia—A mark directing to the richest part of the vein.
Guijarro—Pebble.
Guijo—The iron spindle of the shaft of machinery.
Guixa—Quartz.
Hallilitador—He who supplies money for working a mine.
Hachas—Axes, hatchets.
Hacienda—Farm; estate; establishment for reducing ores.
Hacienda de beneficio—Establishment for reducing ores.
Hacienda de fundicion—Establishment for smelting ores.
Haciendero—The superintendent of the hacienda.
Hechado—Dip of the lode.
Herramienta—Tools; taken figuratively, it implies a borer and hammerman.
Hierro—Iron.
Hierro colado—Cast-iron.
Hierro labrado—Wrought iron.

Hilo—A small vein or thread of ore in a lode.
Hilo de la veta—Line or direction of the vein.
Hilos altos—Threads or small veins of ore falling into or proceeding from the upper or hanging wall of a lode.
Hilos baxos—Threads or small veins of ore proceeding from or falling into the lower wall of a lode.
Hoja de lata—Tin-plate.
Hoja de laton.—Sheet-brass.
Hoja de libro—Finely laminated clay; talc; lit. leaf of a book.
Horno—A furnace.
Horno de fundicion—A smelting-furnace.
Horno de magistral—Roasting-stove for copper stove.
Huaco—A hollow.
Hueco—A hollow place.
Huembas—Small rough beams of buildings.
Hundido—Sunk in; workings which have fallen in.
Incorporar—In amalgamation, to add the first charge of quicksilver. The term *cebar* is applied to the adding the subsequent charges; it also means the act of mixing in thoroughly the whole of the quicksilver, with the torta of wet ore.
Ingenios—Engines.
Instrumentos—Instruments, tools.
Intendente—Intendant.
Interventor—Inspector, representing the interest of the proprietors by whom appointed, or of the *aviador*.
Irido—Iridium.
Jantilla—A double-handed ladle into which the melted silver falls from the cras.
Jaspe—Jasper.
Jornaleros—Day labourers.
Jorongo—A small basket; also a blanket.
Labor—A work from which ores are extracted; in general, all work of the mine, and especially the front work.
Labores de hacienda—All workings in a mine not let to tributors.
Ladrillera—An iron or stone mould in which the melted silver is poured in order to form the barra.
Ladrillos—Bricks.
Lama—Slime or schlem from the amalgamation.
Lamero—The lama when merely thickened by admixture with saltierra.
Lameros—Lama-pits.
Lancha—A sort of hard freestone.
Lapiz—Black lead.
Lapiz encarmado—Red chalk.
Laton—Brass.
Lava—Lava.
Lavador—A man employed in washing the ore after amalgamation, or rather, in cleansing the amalgam.
Lavaderos—Gold-washings; washing vats or tubs for separating the amalgam from the lama or slime.
Lazadores—Men who procure people to work in the mine; also men employed to catch cattle.
Lena—Fire-wood.

Lenadores—The workmen employed to carry and serve the wood in the smelting-furnace; also, the wood-cutter; collectors and sellers of fire-wood.
Lenter nillas—Large vertical wheels of the stamping apparatus.
Ley—Standard of the metals; contents in pure silver.
Ley de oro—Quantity of gold contained in the silver.
Ley de plata—Quantity of silver contained in the ore.
Libramiento—Warrant for payment for bars of gold or silver delivered at the mint, or order for funds.
Libranza—A bill of exchange.
Liga—Flux.
Limadura—An appearance put on by the quicksilver in certain stages of the process of amalgamation, which is noticed at the edges of the amalgam, washed in the bowl for making a *tentadura*, or trial.
Limpia—Clearing out of rubbish and ruins from the old work in a mine.
Lis—A particular state of the amalgam observed by means of the *tentaduras*, or trials, in the bowl.
Llano—A plain, flat ground.
Llevada—Carriage; transport.
Llevador—Carrier, conductor.
Lodo—Mud.
Losa—A flat stone.
Lumbrera—An air-shaft; an adit-shaft.
Macero—He who has the charge and direction of crushing and grinding the ore in the tahonas, previous to amalgamation.
Macizo—A solid untouched part of the vein.
Madera—Timber.
Maestro herrero—Master blacksmith.
Maestro carpintero—Master carpenter.
Magistral—Copper pyrites, used in amalgamation.
Malacate—A horse-whim.
Malacatero—A whim driver.
Malacate doble, or Malacate sencillo—The former whim has bags made of two ox-hides, holding 1,250 lbs. of water; the latter one hide, and holding half the quantity.
Maiz—Indian corn, the principal food used at the mines.
Manantial—A spring of water.
Mandadero—Errand-boy.
Mandon—Master miner or overseer.
Manga—Level divided for ventilation; air-pipes; a bag or strainer used to separate the quicksilver from the *pella*.
Manganesa—Manganese.
Manta—A blanket or horse-cloth, used to contain ores or tools to be brought up by the malacates, now replaced generally by sacks made of the fibres of the agave, or ox-hides.
Mantear—To raise ores from the shaft in bags or mantas.
Manto—A bed or circumscribed stratum.
Maquina—A machine.
Maquinas de vapor—Steam-engines.
Maquila—Rate paid to the proprietor of a mill, or reduction-work, for reducing ore on another party's account; applied chiefly to reduction by amalgamation.

Maquilero—One who dresses ores on hire.
Marco—8 ounces or lb. Spanish, equal to 3,552 grains English.
Marco de oro—8 ounces of gold.
Marco de plata—8 ounces of silver. The marco de oro, or marco de plata may be standard, or otherwise.
Marmol—Marble.
Maroma—A rope to pull or draw by as a hawser.
Marquesitas—Mundic ; iron pyrites.
Martillo—A hammer.
Martriquila—A registry for miners, &c.
Maza—Stamp-head for pounding the ores.
Mecha—A match or fuze.
Medida—A measure.
Mejora—Improvement.
Mejora de boca—A term used when an improvement or alteration is made in the entrance to a mine.
Memoria—Weekly account of disbursements or mine expenses.
Mercurio—Quicksilver.
Merma—Loss of quicksilver in amalgamation or of lead in smelting.
Meson—An inn mostly appropriated to muleteers, &c.
Metal—Metal, ore.
Metal de ayuda—Metal or ores added in smelting, to assist in the reduction of the silver ores ; lead, or galena, for example.
Metal pepena—Selected and picked gold and silver ores.
Metales communes—Common ores.
Metales de fundicion—Ores for smelting.
Metales plomosos—Ores impregnated with lead.
Metales porosos—Porous ores.
Metapiles—Grindstones used in the tahonas ; also pigs of copper used in the hot amalgamation.
Mexquite—Robinia, or acacia ; a wood much used in mines.
Mineral—Ore ; mineral ; recently applied to a mining district, formerly and still called Real de Minas.
Mineria, deputacion de—A tribunal cognizant of mining matters, elected in most cases by the mine-owners of the district.
Minero—A miner, an underground agent.
Minio—Red lead.
Modelos—Models.
Mojon—A landmark, used to mark the limits of pertenencias.
Molibdena—Molybdena.
Molienda—The act of grinding or pounding the ores, sometimes used to designate the ores ground, "*La Molienda.*"
Molinete—Shaft of tina.
Molino, or Mortero—Stamping-mill.
Molonques—Crystallization of silver ores ; very rich.
Montana—A mountain.
Montes—Woods.
Monton—A heap of ore ; a batch under the process of amalgamation, varying in different mining districts. At Catorce, 36 quintals ; at Guanaxuato, 35 quintals ; at Real del Monte, Pachuca, Sultepec, and Tascs, 30 quintals ; Zacatecas and Sombrerete, 20 ; Fresnillo, 18 ; Bolanos, 15 ; and at Valenciana, 32.

Mozo—A man-servant.
Muestras—Samples.
Mufla—A tuyere.
Natas o Escorias—Slags.
Natron—Native carbonate of soda.
Negociacion—Business, undertaking; as a mine, or set of mines, &c.
Nicolo—Nickel.
Nitro—Nitre.
Nivel—Level.
Niveles de agua—Water-levels.
Noria—An endless chain with buckets attached, revolving round a wheel; it is used underground for drawing water out of the pozos or sinks, which are carried down to a greater depth than the principal shaft; also, a common superficial machine for raising water.
Obras—Workings.
Ocre—Ochre.
Ocre rojo, or Ocre colorado—Red ochre.
Official de carpintero—Journeyman carpenter.
Official de Albanil—Journeyman bricklayer.
Ojo—Bunch or small spot of ore in a lode.
Ojo de polvilla—Spots of rich ore.
Ojo de vibora—Black sulphuret of zinc.
Onique—Onyx.
Opalo—Opal.
Operanos—Workmen.
Ordenanzas de mineria—Code of mining laws.
Oro—Gold.
Oro de copela—Fine gold.
Oro empolvado—Gold dust.
Orphimento, or Oripomente—Orpiment.
Pacos—Earthy ores, consisting of oxide of iron mixed with various ores of silver; when of a red colour they are frequently called colcorados; they are generally found near the surface.
Paja—Straw.
Pala—A wooden shovel.
Paldion—Palladium.
Palanca—A lever, a pole on which a weight is supported by two men.
Palansa de hierro—Crowbar.
Palmo—Quarter of a vara or Spanish yard.
Panino—The ground or country through which the lode runs; also, the matrix.
Panizo—Hornstone.
Parada—A relief or change of men, mules, or horses.
Parcionero—A partner in the mines.
Parihuela—A letter.
Partido—Division of ores between the owners and buscones.
Pasta—Uncoined silver.
Patio—A yard, court; floor of a court on which the ores pass through the process of amalgamation.
Patio de amalgamacion—Amalgamation court.
Pegador—Man who sets fire to the matches for blasting.
Pella—The silver mixed with quicksilver when all the latter metal has

been forcibly pressed out, except the portion which can only be separated by distillation.

Peltre—Pewter.

Peones—Native labourers or assistants; day labourers.

Pepena—Picked ore of the best quality; rich ore.

Pepenado—Cleaned ores.

Pepenadores—Cobbers, cleaners, and classers of the ores.

Pepitas—Small grains of native silver or gold.

Peritos—Intelligent or practical persons selected as arbitrators to decide scientific or practical questions or disputes, or to determine the underlay of veins prior to fixing the limits of the *pertenencias*.

Perla margarita—Pearl.

Pertenencia—Extent of 200 varas upon the course of a lode, to which a title is acquired by denunciation; the breadth varies according to the underlay of the vein, from 112½ varas to 200 varas.

Peso—A dollar; any weight.

Petlanques—Crystallizations of silver ores; also, silver ores which are very conspicuous in the matrix; for example, petlanque colorado is the red antimonial silver, whether crystallized or otherwise.

Pez—Pitch.

Pico—A miner's pick.

Piedra—Stone.

Piedra de toque—Touchstone.

Piedra cornea—Hornstone.

Piedra iman—Loadstone.

Piedra podrida—Rottenstone.

Piedra pomez—Pumice-stone.

Piedras de mano—Good pieces of ore, sometimes carried up by hand, and often assigned to pious purposes.

Piedras preciosas—Precious stones.

Pilares, or pilarejas—The pillars of a mine.

Pileta—A trough; the hollow basin before the smelting-furnace into which the metal flows; tank or small reservoir underground to collect the water of infiltration.

Pina—The cake of silver left after the quicksilver has been distilled off.

Pinta—The appearance, whether favourable or unfavourable, of a fragment detached from the lode; the mark of particular metals by which their value is recognised according to their appearance to the eye.

Pintra—To exhibit pintas, or indications of ores.

Pirites—Sulphuret of iron.

Piso—The bottom or floor of a work.

Pison—A rammer.

Pita—Thread made of the fibre of the agave or maguey.

Pizarra—Slate.

Plan—A bottom working, or working driven from the bottom of a level, adit, &c.

Plancha—Pigs, as *plancha de plomo*, pigs of lead.

Plata—Silver.

Plata de ley—Standard silver.

Plata pina—Silver after distilling off the mercury.

Plata parda azule y verde—Muriate of silver of different colours.

Pleito—A lawsuit.
Platina—Platinum.
Plomo—Lead.
Plomosos—Applied to ores containing lead.
Poblar—To set on workmen in any mine.
Polvillones—Rich ores.
Polvillos—Applied to ores, tender, rich.
Polvillos buenos—Good ores of the kind.
Polvo—Dust.
Polvora—Gunpowder.
Polvorilla—Black silver, disseminated sulphuret of silver.
Porfido—Porphyry.
Potasa—Potash.
Pozo—A sink on the inclination of the vein; a pit, a well.
Presa—A dam.
Protocolo—Minutes.
Pueble—Actual labour in the mine, with the number of workmen at least prescribed by the mining laws.
Puertas—Very strong rock, which conceals the vein, and which requires blasting ere the vein is discovered; also doors.
Pulgada—An inch.
Quadrado—A square.
Quajado—Dull lead ore.
Quarzo—Quartz.
Quebrado—A ravine.
Quebradores—Cobbers or breakers of the ores; men who break up the ores on the surface.
Quemadero—Burning house or place.
Quemazon—The barren scorched appearance of the crest of a metalliferous lode protruding from the surface of the mountain.
Quilate—Synonymous with carat; for example, gold of 22 quilates contains 22-24th parts of pure gold, just as the English standard gold of 22-24th parts of pure gold. The quilate is divided into 4 granos Spanish.
Quintal—4 arrobas or 100 lbs. Spanish, equal to 101 45-100 lbs. English.
Quita pepena—A man who stands at the mouth of the shaft to see that none of the metal is stolen.
Ramo—A branch from the main vein.
Rancho—A detached farm-house and ground; the house is often nothing more than a hut.
Raya—Weekly account of the mine expenses.
Rayador—Clerk who keeps account of the workmen's time, the stores received, &c.
Real—1-8th of a dollar; a mining district.
Real de minas—The term generally applied to a mining district; although Mineral de Minas is also now used.
Reata—A rope about as thick as a finger, or larger, used as lashings to *cargas*.
Reatilla—A single twisted smaller rope.
Rebaxe—A working down of high ground.
Rebollura—A mixture of the ground ore with the usual re-agents or fluxes.

Rebosadero—Crest of a vein.
Recina—Rosin.
Recuesto—Inclination of a vein.
Regador—One who has a right to a certain share of water for irrigation.
Registrar—To get an entry made by the proper officer of a party taking possession of a new mine.
Registro—An entry as above described.
Reliz—The wall of the vein.
Remolino—Mass or bunch of ore.
Rendirse—In amalgamation said of a torta when the amalgamation is complete.
Repasar—The mixing together of the ore, quicksilver, and other ingredients in the wet state, in order to extract the metal; to work the quicksilver into the tortas of ore under amalgamation, done by treading them with mules or men.
Repasador—Labourer who treads the quicksilver into the ores under amalgamation.
Rescatador—Ore purchaser.
Rescate—Public sale of ores.
Retortas—Retorts.
Riscos—Crystals.
Rosicler—Ruby silver; red antimonial ore.
Rio—A river.
Rubi—Ruby.
Ruedas—Wheels.
Rumbo—Point of the magnetic compass.
Rumbo de la veta—Line or direction of the vein.
Saca—The ore obtained from a mine in a given space of time.
Sacabocados—Punches.
Sacabuches—Hand-pumps.
Sal—Salt.
Sala—The principal room of a hacienda, or any other building.
Salitre—Saltpetre.
Sal mineral—Mineral salt for amalgamation.
Sal tierra—Impure or earthy salt.
Salineros—Applied to ores requiring much salt in amalgamation.
Salones—Saloons, large halls, hollows, or cavities in a lode.
Sangria—Letting off water by piercing the rock or other substance which dammed it in.
Sanguinaria—Bloodstone.
Scrape—Blanket, the usual dress of miners.
Sebo—Tallow or suet used for machinery, &c.
Sierras—Saws; chains of mountains.
Silla—A saddle; a leather which passes over the men's shoulders to protect them in carrying the ore.
Sitio de labor—Land-measure, 5,000 varas in diameter.
Sobrante—Surplus, profit, residue.
Socabon—An adit or water-level driven from the earth's surface, either on the course of a lode, or to intersect it.
Soga—The rope to which the bota is attached.
Soguilla—The rope for the botillas de burro, botas chicas, or mantas.
Sold adura—Solder.

Soliman—Corrosive sublimate.
Sombra—Shade; grey tinge of certain ores or matrices of ores.
Soto minero—Sub-miner.
Soplete—A blow-pipe.
Sucino—Amber.
Tablas—Planks.
Tahona—A mill of small horizontal stones.
Tajadera—Wedge to break the tinas.
Tajo—A cut.
Tajo abierto—An open cut.
Talco—Talc.
Talega—Bags of dollars containing 1,000.
Tanda—Task; compulsory labour; days appointed for working the mine; duration of the period in which a regador is entitled to use running water for irrigation.
Tanque—Tank or artificial pond.
Tantalio—Tantalum.
Tapa ojos—Bandage for the eyes; used to cover the eyes of mules when treading the ore in the patio or elsewhere.
Tarea—A task; also a certain quantity of wood for fuel; the quantity cut upon one task.
Tejamanil—Shingle for roofing.
Tejo—Cake of metal.
Tellurio—Tellurium.
Tenates—Sacks made of pita, or hide, for raising the ore on men's shoulders; large leather or coarse linen bags, in which the tenateros remove the ores and rubbish.
Tenatero—Ore-carrier from the workings to the surface, or to the despacho only.
Tentadura—An assay or trial.
Tepetate—Rubbish remaining after cleaning the ores; also applied to all the earth of the mine which contains no metal; barren rock through which the ore runs.
Terquesite—Native carbonate of soda.
Terreros—Heaps of attle and rubbish from the mine.
Tersoreria—Treasury.
Testera—A dyke interrupting the course of a lode.
Texear bien en horno—When the litharge is thrown out from the furnace.
Tienda de raya—A shop at which the miners obtain weekly credit.
Tierra pesada—Barytes.
Tierras—Earths, applied to ores, earthy poor.
Tierras appolvilados—Ores a degree inferior to azogues apolvillados.
Tierras communes—Common earthy ores.
Tierras de morlero—Poor stamped ores.
Tina—A vat or jar.
Tiro—A shaft.
Tiro de mulas—A set of mules.
Tiro general—The principal shaft.
Titanio—Titanium.
Tornero—A wooden vat.
Torta—A certain quantity of ore under amalgamation forming one heap, which, being of a flat shape, is called a torta or cake.

Torta rendida—Amalgam ready to undergo the washing operation.
Trementina—Turpentine.
Triangulos—The cogs of the stamps.
Tribunal de minera—Mining tribunal.
Trompeto—A small malachite.
Tungstena—Tungsten.
Turba—Turf, peat.
Turbit mineral—Yellow oxide, or sulphuret of mercury.
Uranio—Uranium.
Vapor—Steam ; foul air in a mine.
Vara—A Spanish yard, equal to 33 inches English nearly, 109 30-100th varas, equal to 100 English yards.
Velas—Candles.
Velador—A watchman who takes care of the mine day and night ; an under-miner.
Vena or veta—A vein or lode ; it is called *manta* (a cloak), when it is a bed ; *clavada* (upright), when it is vertical or nearly so ; *echada* (inclined), when it has a certain dip or inclination ; *obliqua* (oblique), when it goes in that direction through the mountain ; *serpenteada*, when in a serpentine direction ; *socia* (companion), when it is joined with another ; *rama* (branch), when it proceeds from the main vein.
Verde tiero—Verditer.
Vermellon—Vermilion.
Veta madre—The mother or principal vein.
Vidrio—Glass.
Vigas—Beams, split or sawed timber.
Vitriolo—Vitriol.
Vitriolo azul—Blue vitriol.
Vitriolo blanco—White vitriol.
Vitriolo verde—Green vitriol or copperas.
Voladoras—Grinding-stones of the arrastres.
Vuelta—The glow of the silver in cupellation when the last film of oxide of lead suddenly separates and disappears.
Xabon—Soap ; a peculiar description of ores.
Xabones buenos—Good ores of the above description.
Xacal—A hut in which ores and tools are kept.
Yesca—Tinder or touchwood.
Yeso—Sulphuret of lime.
Yunque—Anvil.
Zacate—Maize straw or grass given to the mules.
Zanca—A ditch.
Zurron—A sack made of leather ; cochineal is packed Zurrones.

FRENCH, SPANISH, AND GERMAN SMELTING TERMS.

CONTRACTIONS.—Fr. *French;* Sp. *Spanish;* Gm. *German.* *Cp.* Copper ; *Sl.* Silver ; *Ld.* Lead ; *Tn.* Tin ; *Ir.* Iron.

Abzug—Gm. sl. ; sulphurated litharge dross, in silver refining.
Abstrich—Gm. sl. ; impure brown litharge, in silver refining.

Arastre—Sp. sl.; crushing-mill.
Autel—Fr.; the fire-bridge of the air-furnace.
Aspirateur (fourneau)—Fr.; air or wind furnace.
Affinerie—Fr.; refining metals.
Blicksilber—Gm. sl.; crude silver, from silvery lead, not quite fine.
Brandsilber—Gm. sl.; refined silver, from silvery lead.
Bleistein—Gm. ld.; regule from coppery (&c.) lead ores.
Brasque—Fr.; lining of close-beaten charcoal.
Battitures—Fr.; forge-scales of oxide of iron.
Cingler, Cinglage—Fr. ir.; shingling.
Crasses—Fr.; clots, dross.
Castine—Fr. ir.; limestone.
Carcasses—Fr. sl.; coppery residues of liquiation for silver.
Cuivre en grains—Fr. cp.; beanshot copper.
Cuivre en plumes—Fr. cp.; feathershot copper.
Cuivre noir—Fr. cp.; coarse copper for refining.
Cuivre ampoulé—Fr. cp.; crude copper ready for refining, called "pimple copper."
Chemise—Fr.; lining of a furnace.
Capelline—Sp. sl.; the iron bell under which the silver amalgam is distilled downward.—See *Pina*.
Creuset—Fr.; crucible; receiving-pit of a furnace.
Cadmies—Fr.; metallic soot; sublimate.
Centner—Gm.; proportionate weight of 100, whether pounds, ounces, loths, or grains.—See *Loth*.
Darrlinge—Gm. sl.; copper residue from silvery copper, sweated out by lead.
Decrassage—Fr.; skimming, cleaning.
Dame—Fr. ir.; the front hearth-stopper of the high blast furnace.
Dunnstein—Gm. cp.; poor copper regule.
Erzmehle—Gm.; ground ore.
Etain en larmes—Fr.; grain tin.
Eclair—Fr.; the "brightening" of fine silver in cupellation.
Frischstuck—Gm. sl.; silvery lead eliquiated from silvery copper ore.
Fonte—Fr.; cast metal; generally cast iron.
Fraisil—Fr.; broken small charcoal.
Fourneau à manche—Fr.; low blast furnace.
Floss-ofen—Gm. ir.; the high blast furnace.
Foyer—Fr.; fire-hearth of a furnace; focus.
Fonte crue—Fr.; fusion of regule from raw ore.
Fallung—Gm.; precipitation in watery solution.
Gahrkupfer—Gm.; refined copper.
Gahrschlag—Gm.; refinery slag.
Gahrproof—Gm.; refining test.
Gahrspan—Gm.; the refining assay sample.
Gahreisen—Gm.; the iron rod for drawing the sample.
Gahrost—Gm.; the copper after the last roasting.
Gift Mehl—Gm.; arsenic soot.
Hutte—Gm.; foundry; kiln; smelting-furnace.
Huttenwerke—Gm.; smelting-house.
Heller—Gm.; a weight; ½ pfennige; about 7 grs. impl.—See *Pfennige*.
Houille grasse—Fr.; bituminous coal.

Houille sèche—Fr.; coal little or not bituminous.
Kupferstein—Gm.; regule from coppery lead ores, twice roasted.
Kupferleg—Gm.; regule from bleistein, roasted with quartzy copper ores, &c.—See *Bleistein.*
Krummofen—Gm.; low blast furnace.
Kornig—Gm.; grainy, as *grob-kornig*, coarse-grained.
Loupe—Fr. ir.; the ball or bloom from the puddling furnace.
Lama—Sp. sl.; fine ground ore, ore mud.
Loth—Gm.; a standard weight about ½ ounce impl.
Laitiers—Fr.; fusible slags.
Lingotière—Fr.; ingot mould.
Monteros—Sp. sl.; stampers.
Monton—Sp. sl.; small heaps of ore mud, for amalgamation.
Magistral—Sp. sl.; roasted copper ore, for mixing in the amalgam heap.
Matte—Fr.; regule, melted sulphuret.
Minéral—Fr.; ore.
Neiderschlag—Gm.; precipitate.
Noyer—Fr. sl.; the assay being covered with unabsorbed litharge.
Offenbruch—Gm.; metallic soot or sublimate.
Plom d'œuvre—Fr. sl.; silvery lead for refining.
Poussée—Fr. sl.; fusion with nitre, to scorify the copper, &c., and leave the silver.
Pina—Sp. sl.; piles of amalgam for distilling down the mercury.
Patio—Sp. sl.; amalgamation-floor.
Plata pina—Sp. sl.; the porous silver cakes left after distilling down the mercury.
Pocherz—Gm.; poor ore.
Pfennige—Gm.; a weight, 1-16th loth.—See *Loth.*
Paillasse—Fr.; the bed of a furnace.
Quintal métrique—Fr.; 100 kilogrammes, nearly 217 imperial pounds.
Quintlein—Gm.; a weight, ¼ loth, or 1-16th ounce.—See *Loth.*
Rohstein—Gm.; copper regule, first fusion.
Rable—Fr.; rabble; a toothless iron rake, for skimming, &c.
Ressuage—Fr. sl.; sweating out the lead for eliquiating the silver from silvery copper, &c.
Rafraichissage—Fr. sl.; melting the silvery copper, &c. with lead, to extract the silver.
Ringard—Fr.; iron rake for stirring melted metal.
Rustine—Fr. ir.; backstone of the high furnace hearth.
Rosette—Fr. cp.; refined copper, coated with bright red oxide, by plunging, hot, into water.
Rondelle—Fr.; the round cake of rosette-copper.
Rost stadeln—Gm.; enclosed roasting, sometimes called "case-roasting."
Rotissage—Fr.; roasting.
Rosten—Gm.; roasting.
Raffinage—Fr.; refining.
Réverbère—Fr.; reverberatory (furnace).
Refractaire—Fr.; fireproof.
Rocher—Fr. sl.; the "branching" thrown out by fine silver in cooling.

Stofferz—Gm.; pure ore.
Spleiss-ofen—Gm. cp.; split furnace; refining-furnace with two receivers.
Spurrost—Gm. cp.; regule after three roastings.
Spurrstein—Gm.; the spurrost melted.
Speise—Gm.; metallic sediment from cobalt-glass, contains nickel.
Schlacke—Gm.; slag, scoria.
Seigerung—Gm.; eliquiation.
Speissig—Gm.; fibrous, as ***klar speissig***, fine fibrous.
Stahlstein—Gm.; crude steel from the ore.
Scories—Fr.; metallic slags.
Saigerdorn—Gm. sl.; the coppery residue from darrlinge (which see), after sweating out most of the lead.
Schlakstein—Gm. cp.; very poor regule, chiefly iron and sulphur.
Saigergasse—Gm. sl.; eliquiation gutter, to draw off the eliquiating lead from silvery copper, &c.
Saltierra—Sp. sl.; salt earth (containing 12 or 13 per cent. salt), for mixing in the amalgamation-heap. See *Torta.*
Schlich—Gm.; fine-ground ore; ore mud.
Stuckofen—Gm.; half-high blast furnace.
Schachtofen—Gm. ir.; high blast furnace.
Schlamm—Gm.; fine ground ore.
Saumons—Fr.; blocks of metal, especially tin.
Spadele—Fr.; shovel for turning the roasted ore.
Titre—Fr.; the proportion of precious metal in an alloy.
Tuyère—Fr.; tube, blast-pipe.
Trapiche—Sp. sl.; grinding-mill.
Torta—Sp. sl.; the great flat heap of silver ore, for amalgamation.
Trompe—Fr.; water-blowing engine.
Tellersilber—Gm. sl.; silver left from distillation of the amalgam.
Treibheerd—Gm. sl.; refining-furnace.
Tole—Fr.; sheet iron.
Triage—Fr.; sorting, picking.
Treibscherben—Gm. sl.; large compact cupells; roasting-tests.
Trockene Shneidung—Gm.; separation by fire.
Usine—Fr.; smelting-house.
Verquicken—Gm.; amalgamation.
Verschlacken—Gm.; scorification.
Wismuth Graupen—Granular bismuth, eliquiated from the ore.

PART III.

Original Papers.

THE MINES OF IRELAND.

Out of the thirty-two counties of Ireland, nineteen are reported to contain iron, seventeen copper, eighteen lead, and sixteen coal.

Deposits of the precious metals have likewise been discovered in times of remote antiquity. Ancient records inform us that during the period in which our own island was in a comparative degree of barbarity, the Irish enjoyed a greater degree of civilization than most of the nations of Europe. This may probably have arisen from their insular condition and the early introduction of Christianity. Among the earliest accounts of mining may be mentioned the chronology of the Four Masters, A.M. 3656. In this it states:—"In this year gold was first wrought by Tigernmas, King of Ireland, in the woods eastward of the Liffey; Uchadan, of the men of Cualan, was the artificer who first worked it, and by him were ornaments of gold and silver first made." The Liffey runs to a great extent through this county, entering it from that now called Wicklow, then Cualan; and O'Flaherty, in the *Ogygia*, yet more particularly states this mine to have been manufactured in that part of Cualan called Fothart, and on the eastern bank of the river Liffey; while Ballymore Eustace, a town now included in the county Kildare, stands in ancient Fothart, and on the eastern bank of that river, suggesting, not lightly, that its vicinity might have been the California of the tradition which the Irish historians preserve. The annals of the Four Masters were compiled in the early years of the seventeenth century; and it is

worthy of observation, that while they record that in A.M. 3872, King Monamon caused "collars of gold" to be manufactured for the petty kings and queens of Ireland, and the museum of the Royal Irish Academy verifies the voice of history, by the numerous gold antiques of admirable workmanship which it exhibits, and which are confidently classed as of Pagan days, and of native material and manufacture, the narrative might yet be deemed wholly apocryphal, and, perhaps, relied upon as impeaching the authority of the whole work down to the close of the eighteenth century; but then it was that in 1775 native gold was accidentally found to occur in the bed of the rivulet that descends from the northern banks of Croghan-Kinshella Mountain, south of the place which the above tradition would seem to designate, but still within the same territory of Cualan or Wicklow. This discovery led to mining operations, which were feebly conducted for several years; but neither the intelligence nor energy necessary for such undertakings was applied, so that, after several trivial attempts, they were finally abandoned, although at various periods since small particles of gold have been discovered.

In A.M. 3817, according to the same tradition, King Ennius caused silver shields to be forged at Argiodross, in the present county of Kilkenny; while another Ennius, surnamed *Derg*, "the red," is by some stated to have caused silver to be coined at the same locality, but the Masters do not adopt this latter assertion. Passing into the sixth century of the Christian era, the biography of the early saints of Ireland records, in that and the immediately succeeding centuries, various works of native art in metals, and many such are still surviving in the museum. Croziers and crosses, beautifully carved, and evidencing that they were once inlaid with gold and set with gems, vases of silver for ecclesiastical uses, reliquaries and shrines of gold and silver for bones of saints and copies of the gospel, bells and cups, gold rings and bracelets, are numerous in the same repository. In the ninth century Donatus is supposed to be the author of a "Description of Ireland," in which it is styled *insula dives opum, gemmarum, vestis, et auri;* and Nennius expressly writes of Lough Lene (the upper Lake of Killarney), that it is surrounded by four circles—the first of tin, the second of lead, the third of iron, and the fourth of copper. Modern discoveries have singularly confirmed this account also; indications of lead and of iron have been observed about the lake; and of the copper, Smith, in his "History of Kerry," says—"Few mines in Europe have produced such a quantity of copper ore as that work lately discovered at Mucruss, near Killarney, having afforded, in the year after its working, 375 tons of ore, which produces, from an ounce of the general sample, 5 dwts. 8 grs. of copper, and single pieces of pure copper have been raised there of several hundred-

weights." This valuable mine, and that at Ross Castle, adjacent, were deserted about 50 years since, as in despair; but, on the application of steam in later days, have again proved most productive. The "Annals of Ulster" say that pearls were found in the above lake, which kings hung in their ears; and pearls, it may be here mentioned, are also said to be found in Lough Corrib, county Galway.

In the year 1276, a silver mine in Ireland was ordered to be opened and worked, and another royal silver mine is spoken of in the year 1289, and a record of 1303 further proves that the attention of our English sovereigns was early directed to the development of the mines of this country. "One of the king's miners in Ireland," it recites, "having killed a man, his companions were afterwards beaten, and their mines filled and broken down, so as they were forced to quit them, whereupon they preferred their complaint to his majesty, who ordered a commission to inquire into the circumstances, and do them right." Thirty-one years after another commission was directed to investigate the Irish localities where mines existed; and in 1360 certain persons were appointed to explore the mines of gold and silver in Ireland, "because," says King Edward, in the language of the writ, "it is given to us to understand, that many mines of gold and silver exist in that our land." Henry VI. projected, at the commencement of his reign, authorizing an examination of such mines here, and the assaying and smelting of the same. In 1458 the mines of Clomeen, in the county Wexford, were the subject of an Act of the Parliament of Dublin (unprinted). The State Papers, in 1543, relate a very active search for Irish mines made by Thomas Agard, under the authority of the Lord Deputy St. Leger; and in 1546 a proposal was entertained at the council-board for effectuating their workings by an incorporation under his superintendence. "There are in Ireland," translates Holinshed from Stanihurst, "such notable quarries of marble, such store of pearl and other rich stones, such abundance of coal, such plenty of lead, iron, slate, and tin; so many rich mines furnished with all kind of metals, as Nature seemed to have formed this country for the storehouse or jewel-house of her chiefest treasure. Howbeit, she hath not showed herself so bounteous a mother in pouring forth such riches, as she proveth herself an envious step-dame, in that she instilleth in the inhabitants a drowsy litherliness to withdraw them from the insearching of her hoarded and hidden jewels." Boate, in his "Natural History," assigns another cause for the neglect of the Irish mines:—"The old English in Ireland (that is, those who are come in from the time of the first Conquest until the beginning of Queen Elizabeth's reign) have been so plagued with wars from time to time, one while intestine among themselves, and another while with the Irish,

that they could scarce ever find the opportunity of seeking for mines or metals." The same historian says, on authority that he thinks credible, that gold has been found in a rivulet called Miola, in Ulster, brought down, as he considered, from some mine in the mountain Slieve-Gallen; and the Irish newspapers of 1759 announce indications of a gold mine in Inchmore, an island of the Shannon.

Of the *silver and lead mines*, besides the tradition of the Four Masters, relating to Argiodross, it is to be noted that there is in the Vice-Treasurer's office, "An account of lead and silver made in the royal mines in the county Tipperary (of which was also preserved a description with maps), out of which the king is to have the sixth part of the lead, and the tenth of the silver, for the year to Christmas, 1638;" and another similar account for 1639, in which latter year Lord Strafford transmitted to King Charles an ingot of silver hence, which weighed 300 ounces, writing at the same time to the Lord Treasurer, that "the king's duty forth of the royal mines here will be 500*l. per annum*." This mine was announced, in 1712, as "now brought to good perfection," and is to this day usefully and productively worked, giving the name of Silver Mines to the locality. The "Examinations of John Bealing, locksmith, touching a silver mine in Ireland," taken in 1607, and preserved in the British Museum, probably relate to this of Tipperary. Native silver has also been found in Wicklow, near the copper mines. Wakefield mentions a silver mine as once worked beside Williamstown, in the county Kildare, which seems identical with that reported in the *Dublin Chronicle* of 1787, as then at work near the Chair of Kildare. Indications of silver are said to have been also traced in the county Wexford. "There are lead and silver mines in the county Antrim," says Boate, "so very rich that every thirty pounds of lead yieldeth a pound of pure silver;" he also mentions a lead mine in Coney Island, off Sligo. In Faulkner's *Dublin Journal*, of 1784, "lead and silver mines of fair promise" were stated to exist on the estate of Henry Bond, at Derrynoose, county Armagh. Wakefield notes indications of lead at Keady, in the same county, at Dundrum and Clonlegg, in the county Down; at Ardmore, near Waterford; and near Enniscorthy, in the county Wexford. Lead ore has been found in the county Galway, near Lough Corrib, near Oughterard, on the shore of the Bay of Galway, and in the Connemara Mountains; as also at Grange-hill, in the parish of Feighcullen, county Kildare. Lead mines have been, and some are still, worked in the county Clare, at Kilbricken and Ballyhickey; the Bond and Newry mines in Monaghan; in the county Wicklow, at Glenmolaur and Glendalough; and in the county Dublin at Dunsink, at Dalkey, at Ballycorus, and in the demesne of St. Catherine's; while indications of lead were also here found at

Castleknock, Cloghran, Naul, over Clontarf town, near Crablough, and near Killiney Bay; the last was said to contain much silver.

Of *copper mines*, those at Mucruss and Killarney have been spoken of, and other veins are said to be traceable in Crow Island and at Glanflesk, in this vicinity, as are veins of lead and copper at Miltown, in the same county (Kerry). In the elevations, called the Red Hills and Hills of Allen, in the county Kildare, a copper-work was opened in 1786. The principal bed seemed to lie deep in the hill, and even to dip under the valley that separates Dunmurrey from the Hill of Allen. Operations were, however, perhaps prematurely discontinued. The latter hill was considered to promise not less productive masses of copper. Mines of this mineral have been worked at Lisanisce, near Carrickmacross; at Knockmahon, in Waterford; at Dunsink and at Lough Shinney, county Dublin; and at Glan Mountain, in Oughterard;—while indications of copper have been noted at Ballyroan, in Queen's County; also in the vicinity of Gort, county Galway, and at sundry localities in the counties of Cavan, Cork, Derry, Donegal, Down, and Leitrim. In 1764, "a strong course of rich copper ore" was reported as found at Cashell, near Slane, county Meath, "whence great expectations are formed, because the discovery is made in fresh ground, where the vein has no dependence on, or connection with, old workings there, which have been under water between twenty and thirty years." Last, but perhaps the most remunerative, must be mentioned the existing and thriving works of Cronebane and Ballymurtagh, with those of Cronroe and Ballygahan, in the county of Wicklow, and those of Holyford and Lackamore, in the county Tipperary.

Iron mines were formerly worked in the parish of Templecarne, county Donegal; near Tallow, being the Earl of Cork's iron-works;" at Donbilly mountain, in the county Cavan; by the Lisban, in Tyrone; at the foot of Slieve Gallen; near Mount Mellick, in the King's County; near Mount-rath, in the Queen's; in the county Clare, six miles from Limerick; by the side of Lough Allen, at Arigna; and in Slieve-an-Erin, county Leitrim. Iron is also found in the counties of Kerry, Sligo, Mayo, Waterford, Wexford, and Wicklow. There are extensive beds of copper and iron on the estates of Lord Audley, in the county of Cork; and iron-works, which were considered valuable, have been worked in the county Mayo, near Lough Corrib, uninterruptedly, until the timber of the vicinity was exhausted.

Of the *coal mines*, not the least important for consideration, various fields are said to exist, as in the county Antrim, at Murlough; at Mount Charles, in Donegal; at Drumquin, Drumglass, and Coal Island, in the county Tyrone; at Petigoe, in Fermanagh; near Carrickmacross, in Monaghan; near Beltur-

bet, in Cavan; near Athlone, in Westmeath; near Slane, in the county Meath; at and around Arigna, county Roscommon; at Clonmore, county Mayo; at Knockmahon Hill; at the Naul, and near Lough Shinney, in the county Dublin. Of the latter, the petition of a Martin O'Connor, of Silver Mines, to the Irish Parliament, in 1740, and which is now extant, gives the following testimony:—"The petitioner has discovered sea coal, of the same nature as at Whitehaven, on the land of Miss Turner, and also upon the adjoining estate of Sir T. Echlin, Bart., bordering on the Channel, and within a short sail of the city of Dublin, in a district which, from the beginning of time, has stood destitute of all kind of native fuel; whence a colliery, to be brought to perfection in a place thus circumstanced, and so favourably situated for carriage, must prove of singular advantage to the whole nation, and to the city of Dublin in a more especial manner." The Leinster coal district, in the Queen's County, the counties of Kilkenny, Carlow, and Tipperary; and the Munster, in those of Clare, Limerick, Kerry, and Cork, are fully treated of in the various geological reports on Ireland that have from time to time appeared. In the year 1728-1729, Messrs. Benjamin Lund and Francis Hawkbee had obtained letters patent from George II. for the purpose of manufacturing copper ores, extracting of silver from copper, making of brass; also of separating iron from ironstone, with peat, natural coal, or coal charred, and to make thereof malleable iron. In these they state:—"Whereas we purpose not only to work mines for the ores barely, but also to erect proper work-houses, with all the requisite appurtenances of various kinds, for the manufacturing of ores and minerals raised in that kingdom, and whereas a much greater advantage will accrue to that country by such manufactures being raised and carried on amongst themselves, and by their own people, than can possibly arise to them by barely working of their mines, and sending their produce to be manufactured elsewhere: Now, as we have good reason to believe that there are some people concerned in the brass and iron manufactures, who will use their utmost endeavour to frustrate this intended good undertaking, we write and publish this by way of caution to all the gentlemen and others in Ireland on whose estates mines have already been found and worked, or to such on whose estates it is probable that mines or minerals may be hereafter discovered, in order to prevent their making any unwary agreements with those, who would only purchase their ores when raised, and carry them to another place, in order to the working and manufacturing of them, or who will, by keeping such mines in suspense and unwrought, not only greatly prejudice this undertaking, but also in particular all those who are possessed of mines." This design, owing to want of sufficient capital and encouragement from the

landed proprietors of the country, was subsequently abandoned, and smelting has never been carried on with any considerable degree of success in Ireland. As, however, a greater tendency appears at present to embark capital in our home investments than in foreign enterprises, there is every reason to hope that the period is not far distant when the Irish mineral deposits will receive that attention and development which they so well merit; and by the distribution of capital that will ensue, and consequent employment of labour, cannot but be productive of great benefits to both proprietor and peasant.

THE ALUM TRADE AND WORKS OF ENGLAND.

"Alum" is often mentioned by the ancients, but it is perfectly clear that it was different to the alum of the present day. It was most probably a sulphate of iron, sometimes perhaps a sulphate of alumina, and usually a mixture of the two. Where our alum was first discovered is entirely unknown; the manufacture was first carried on in the East. About 400 or 500 years ago, there was a manufactory of it at Edessa, in Syria, at that period denominated Rocca; hence it is supposed the derivation of the term *rock alum*, extensively employed in Europe. Several alum-works existed in the neighbourhood of Constantinople. About the period of the dismemberment of the Grecian empire, the art of making alum was transported into Italy. Bartholomew Pernix, a Genoese merchant, discovered alum ore in the island of Ischia, about the year 1459; nearly at the same time, John di Casto, who was well acquainted with the alum-works in the neighbourhood of Constantinople, imagined that a mineral fit for yielding alum existed at Tolfa, because it was covered with the like trees that grew on the alum mineral near Constantinople. This conjecture was verified, and the celebrated manufactory established there. Another was established at Genoa; about the year 1544 various manufactories were established in Germany; one was erected at Commotau, in Bohemia; at the same time another was built at Alcmaron, near Carthagena, in Spain.

Queen Elizabeth granted letters patent to Cornelius Devoz to mine for alum, but it was not until the latter end of her reign that Sir Thomas Chaloner, who, in his travels in Italy, examining the Pope's alum-works near Rome, and observing the mineral similar to one abounding in the neighbourhood of Guisborough, became desirous of making the attempt; but, as he was unacquainted with the process, he found it necessary to procure

workmen from the Pope's alum-works; by promises of large rewards, he induced them privately to come to England. This circumstance is said to have so exasperated the Pope, who till then had enjoyed a lucrative monopoly of the trade, that he fulminated a dreadful anathema against Sir Thomas and the workmen whom he had seduced. Fuller, in his "Worthies of England," published 1662, thus describes the discovery of alum: "This was first found out nigh Gesburgh, some sixty years since, by that worthy and learned knight, Sir Thomas Chaloner (tutor to Prince Henry), on this occasion. He discovered the leaves of trees thereabouts more deeply green than elsewhere—the oaks broad spreading, but not deep rooted, with much strength, but little sap; the earth clayish, variously coloured—here white, there yellowish, there blue, and the ways therein, in a clear night, glistening like glass—symptoms which first suggested to him the presumption of minerals and alum most properly. Yet many years interceded betwixt the discovery and the perfecting thereof—some of the gentry of the vicinage burying their estates under the earth before the alum could be brought to its true consistency. Yea, all things could not fadge with them until they had brought, not to say stolen over, three prime workmen, in hogsheads, from Rochel, whereof one Lambert Russell by name, and a Walloon by birth, not long since deceased. But when the work was ended, it was adjudged a mine royal, and came to be rented to Sir Paul Pindar, who paid yearly to the king 12,500*l.*, to the Earl of Moulgrave, 1,640*l.*, to Sir William Penneman, 600*l.*, besides salaries to numerous clerks, and daily wages to rubbishmen, rockmen, pitmen, and homemen, or firemen, so that at one time, when the mines were in their majesty, I am credibly informed, that he had no fewer than 800 in pay by sea and land; yet did not the knight complain of his bargain, who, having the sole sale of the commodity to himself, kept up the reputation thereof, and the price of alum at 26*l.* the ton. This did he the easier, because no better, and scarce other, save what from Rome and Rochel, in Europe. But the late long last parliament voted it a monopoly, and restored the benefit thereof to the former proprietaries, who now pursue the work at five several places — 1. Sandsend; 2. Asholme, belonging to the Earl of Moulgrave; 3. Slapywath, Sir William (formerly Penneman's) Darcey's; 4. Dunsley, Mr. Thomas Fairfax; 5. Whitby, Sir Hugh Cholmley. Such is now the emulation between these owners to undersell one another, that the commodity has fallen to 13*l.* the ton. Great is the use hereof in physic, surgery, as a grand astringent. Besides much thereof is daily employed by clothiers, glovers, dyers; and so that some will maintain that another thing, as white and far sweeter of the two, may be better spared, with less loss to the commonwealth."

The successful prosecution of Sir Thomas Chaloner's works, induced the Darcey family to erect another alum-work at Guisborough, and in the year 1615, the works at Sandsend, about three miles from Whitby. At this period, the coal trade was first established at Whitby, and ships were built to sail from there to Sunderland and London. In the year 1649, works were erected at Saltwick by Sir Henry Cholmley and Sir Richard Crispe. These were abandoned in the year 1708, but again resumed in the year 1755 by Ralph Carr, John Cookson, Richard Ellison, and Jonas Brown, Esqrs. Another establishment the same year was commenced at Little Beck by Messrs. Howlett and Matthews. In 1764, works were commenced at Eskedaleside by Richard Jackson and John Yeoman, Esqrs., and at Little Beck by Messrs. Scarth and Thornhill. At the commencement of the present century, alum-works were established at Peak, Stroupehow, Saltwick, Little Beck, Eskedaleside, Sandsend, Kettleness, Lingberry, Boulby, and Guisborough; those at Goodlandbanks, Ayton, Carlton, Saltburn, and Osmotherly were abandoned.

When these works were all wrought, about 6,000 tons were made yearly, so that the market was greatly overstocked, and many families were ruined. About 3,000 tons were made yearly the last years of the preceding century,—the cost was then supposed to be about £14 per ton. About 400 to 500 tons were shipped direct from Whitby to foreign parts; the rest was absorbed by the London market, to be disposed of as opportunity offered. Fuller states, that a mine was worked at Woodfold, near Pleasington, in Lancashire, but had long been neglected, on account of the expense of removing the superincumbent strata. The last adventurer was Sir George Colebrooke, whose speculation in this article terminated in his ruin. Works are now still existing at Whitby, and Hurlett and Campise, in the neighbourhood of Glasgow; there are several in Sweden, in the province of West Goathland. One of the largest is at Hensæter, near the borders of the Wenern Lake, on the west side of the Kinne Kulle Mountain. According to Mr. M'Culloch, the shipments from Whitby, in 1841, amounted to 3,237 tons; the produce from Glasgow was estimated at about 1,200 tons annually. From the same authority, we learn that China is a great seat of the manufacture of alum, and that there was exported in the year 1839, 35,642 piculs (2,120 tons) from Canton. The process of reducing the alum at Tolfa is the most simple; there are several processes, but we shall give a sketch of that employed at Glasgow. The shale, which is obtained from coal-pits, having been exposed for years, has gradually opened in the direction of a slaty fracture, and the chinks in it are filled with a saline efflorescence in threads. This salt is white, with a shade of green, has a sweetish astringent taste, and consists of a mixture of sulphate of iron and sul-

phate of alumina. In order to obtain these salts in a state of solution, nothing more is requisite than to lixiviate this shale with water. The lixiviated ore being left exposed to the weather, forms more salt, which is gradually washed out of it by the rain-water; and this water is collected and preserved for use. The next step is to boil down the liquid to a sufficient state of concentration. The boilers are of stone, and the heat is applied to the surface. This is a great saving, as leaden vessels are not only much more expensive but require more frequent renewal. When the liquid is raised to a sufficiently high temperature in the stone reservoir, pounded sulphate of potash, or muriate of potash, is mixed with it; there is an agitator in the vessel, by which it is continually stirred about: this addition separates the sulphate of alumina or alum. The liquid is let into another trough, and allowed to remain till it crystallizes. In this liquid there are two salts contained in solution, viz. sulphate of iron and alum; and it is an object of great consequence to separate them from each other. The principal secret consists in drawing off the mother liquor at the proper time, for the alum is much less soluble in water than iron, and therefore crystallizes first. The first crystals of alum are found very impure; they have a yellow colour, and seem partly impregnated with sulphate of iron; they are dissolved in hot water, and the solution is poured into troughs and allowed to cool a second time; these, though much purer, are not quite free from sulphate of iron, but the separation is accomplished by washing them in cold water. These second crystals are now dissolved in a quantity of water, as hot as possible, and the concentrated liquid poured, while hot, into large casks, the surfaces of which are covered by two cross-beams. As the liquor cools, a number of alum crystals form on the sides and surface. The casks are allowed to remain till the liquid within is supposed to be nearly of the temperature of the atmosphere. This in winter requires eleven days; in summer fourteen. Liquid has been known to stand in a cask eleven days in summer, at still more than blood heat. The hoops are then removed, as in the manufacture of alum from alum slate. There always remains in the boilers a residue, consisting chiefly of peroxide of iron. This is exposed to a strong heat in a reverberatory furnace, and becomes red. In this state it is washed, and yields more alum. The red residue is ground to fine powder and dried. It can then answer the same purpose as Venetian red for a pigment. By altering the temperature to which this matter is exposed, a yellow ochre is obtained instead of a red. In France, where alum-ores are not abundant, alum is manufactured from clay. This method was first put in practice by Chaptal, when professor of chemistry at Montpellier. Caraudau likewise describes a process, which is practicable and easy, but unprofitable. At Hœnseter, in Sweden,

the quantity of combustible matter in the alum slate is so great, that it is used as fuel for burning limestone. Soda alum was first mentioned by Mr. Winter, in 1810, but before that time it had been made by C. Mackintosh, Esq., of Crossbasket, and Mr. W. Wilson, Hurlet, near Glasgow.

MINING INDUSTRY AND COINAGE OF AUSTRIA.

THE Austrian Government last year published a return of the mineral produce of the Enns, Salzburg, Illyria, Galicia, and Buckovina, during the year 1848, and of Banat and Croatia in 1847. The mountain productions of Salzburg amounted in the past year to 22,784*l.*; and consisted of 473 oz. of gold, 1,650 oz. of silver, 1,265 cwts. of copper, 639 cwts. of vitriol, 32,785 cwts. of rough iron, 2,326 cwts. of ghisa, 1,235 cwts. of sulphur, 1,031 cwts. of arsenic, 500 cwts. of cobalt ore, and 361,166 cwts. of coal. Along the Enns the mineral produce amounted in 1848 to 34,060*l.*, consisting of 1,117,195 cwts. of coal and ampelite, 720 cwts. of alum, 415 cwts. of graphite, 29,674 cwts. of raw iron, and 1,950 cwts. of ghisa. The mountain produce of Illyria, comprising Carinthia, Cragno, and the coast, amounted to the value of 281,559*l.*, and consisted of—

Gold	*Marks*	6½	£214
Silver		15	31
Calamine and zinc ore	*Cwts.*	9,983	242
Quicksilver		2,884	53,814
Lead		665,210	161,845
Cheese		598,652	142,223
Ghisa		22,843	9,909
Ampelite		839,136	10,702
Antimony		175	145
Graphite		1,011	79
Sulphur		40	10
Zinc		2,833	2,125
Alum		401	200
Vitriol		320	20

The mountain productions of Galicia and Buckovina, in 1848, amounted to 41,799*l.*, and consist of—

Raw iron	*Cwts.*	64,904	£17,058
Ghisa		22,964	10,974
Coal		35,588	230
Silver	*Marks*	468	938
Copper	*Cwts.*	1,861	7,448
Lead		137	137
Litharge		561	654
Raw Sulphur		4,902	1,735
Purified ditto		6,382	2,625

The mineral productions of the Banat, in 1847, were—104 marks of gold, 2,759 marks of silver, 6,222 cwts. of copper, 521 cwts. of zinc, 52,737 cwts. of raw iron, 13,277 cwts. of ghisa, 16,653 cwts. of iron in bars, 465 cwts. of copper, 2,065 cwts. of copper, and 447,686 cwts. of coal. The produce of 1848 was $2{,}533\frac{1}{8}$ marks and 4 lotti of silver, and 5,195 cwts. of copper. The quantity of other produce has not been returned. Croatia produced, in 1847, 4,164 cwts. of sulphur. The chemical establishment of Nussdorff, near Vienna, produced in 1848 6,967 cwts. of simple sulphuric acid, and 5,350 cwts. of concentrated, 1½ of nitric acid, 122 cwts. of aquafortis, 46½ cwts. of muriatic acid of first quality, and 81 cwts. of second quality, 40 cwts. of ammonia, and 353 cwts. of sulphate of soda—the total of the estimated value of which is 3,221*l.*

During a period of twenty-six years, from 1821 to 1847, the amount of gold produced from the Crown mines was 36,141 marks, and from private mines, 111,694 marks, making a total of 147,835 marks; the value of each mark being 366½ francs, or 15*l.* 5*s.* sterling, gives an entire value of gold of 2,254,464*l.* The silver produced was 2,465,512 marks; at 24 fr., or 1*l.* each, gives the same amount sterling; of which 1,422,717*l.* were from the Crown mines, and 1,042,795*l.* from private ones. The total of gold and silver produced thus amounted to 4,719,976*l.* The amount of each year's production gradually increased during the period; for, in 1821, the amount of gold was only 3,512 marks, while, in 1847, it was 7,529 marks. Silver in 1821 was only 64,398 marks; while, in 1847, it rose to 115,681 marks.

During a period of fifty years, from 1798 to 1847, the total value of gold coined was 174,351,832 francs, or 7,264,660*l.*, and silver, 439,008,000 francs, or 18,292,000*l.*, making a total of 613,359,832 francs, or 25,556,660*l.* The greatest amount of gold coined in one year was 16,708,000 francs, or 696,166*l.*, in 1843; and the least was 54,743 francs, or 2,281*l.*, in 1801. The largest quantity of silver coined in one year was 48,873,000 florins, or (the value of a florin being estimated at 2*s.*) 4,887,300*l.* sterling, in 1843, and the lowest amount 2,311,500 florins, or 231,150*l.* The influx of foreign gold into Austria, during the twenty-six years first mentioned, was 2,000,000 florins, and silver 2,900,000; and, during that period, the total receipts had doubled, as compared to a like previous period. It appears that all the money coined does not remain in circulation; the most ancient and worn becomes recoined; some portion is employed in the manufacture of jewellery, and a considerable quantity finds its way abroad, not to return, by way of the Levant and Mediterranean, to Africa, Arabia, and Persia. The total amount of gold and silver in circulation in Austria, exclusive of Italy, is estimated at 300,000,000 francs.

MINING IN NORWAY.

According to the report of Mr. Sinding, Bergmester, in Norway, delivered to the Norwegian Government, and published by them in 1849, it appears that, in the year 1847, the total number of miners employed in the Norwegian copper-works were 694; the quantity of ore produced 9,399 tons; total expenditure of the mines, 55,324 dollars. During the same period, the quantity of ore smelted at the different smelting establishments (eight in number), was 10,536 tons; the quantity of copper produced, 546 tons; in the production, 17,228 lasts of charcoal, 795 fathoms of wood, and 3,065 tons of coal were consumed; the total smelting charges were 56,431 dollars. Of this quantity the Alten mines smelted 2,225½ tons, which gave 124 tons 1 cwt. 1 qr. fine copper; 27½ fathoms of wood and 3,065 tons of coal were consumed; the smelting charges were 13,426 dollars. The highest smelting charges are those of Roraas, which are 107 dollars 30 skillings per 100 barrels of ore, each containing 750 lbs.; that of Alten is 93 dollars 23 skillings for the same quantity; the lowest are those of Eidet, which are 66 dollars 10 skillings per 100 barrels. All these establishments, with the exception of the Alten, employ blast-furnaces; the operations there are conducted on the Swansea method. The average per-centage of the ore produced from the different mines is as follows:—Alten, 5·5 per cent.; Quænangen, 7·34; Roraas, 3·06; Sœlbo, 4·05; Meraker, 4·05; Tranfield, Ytteroen, 14·4. Sixty workmen during the same period were employed on the different lodes of chromate of iron: 510 tons of this were obtained at the cost of 5,977 dollars. The establishment for the manufactory of chromate of potash had reduced 458½ tons of chromate of iron, and had used in its reduction 12,428 barrels of coals = 1,380 tons; 163,076 lbs. Russian; 93,257 lbs. Norwegian; and 921 lbs. American potash. The total expenditure of the manufactory was 35,494 dollars 110 skillings; while the produce was 308,890 lbs. chromate of potash, valued at 41,000 dollars—making a profit on the year of 5,505 dollars. The total production of the whole of the district was valued at 252,250 dollars. In the same year, setts (*muthings*) were taken for 15 copper-mines, 4 chrome, and 1 lead. But few of the copper-mines were paying any dividends, the generality merely supporting themselves. With the exception of the works at Omdal, in Tellemarken, and Sœtersdal, near Christiansand, which are now abandoned, all the copper-mines of Norway lay in the northern district, so that we have here the total production of copper as well as that of chromate of iron.

MINING IN GERMANY.

From remote periods the Germans have been celebrated for their skill in mining and metallurgical arts, and the mining schools of Saxony had attained great celebrity previous to the discovery of many of the metals in England. In fact our first copper-miners were Germans, the names of Cornelius Devoz and Daniel Houghsetter being found among the first patentees of the "Mineral and Battery Works" and the "Mines Royal Company," both of which companies are now incorporated under the latter designation. From the construction of the country, absence of a sufficiency of fuel, and various causes, mining operations are conducted on a different system to that pursued in the United Kingdom. The principal mining countries are Hanover and Saxony; the constitution of the mining code is nearly similar in both countries, nor do the processes vary in a great degree. As these, however, are comparatively unknown in England, a brief sketch of the establishments at Hartz, in Hanover, and Freyberg, in Saxony, may not be uninteresting to our readers.

Under the name of the Hartz is comprehended all that natural mountainous district from the centre of which rises the Brocken, and which group contains a variety of rich metallic deposits, which have been worked for ages, and still continue to be the objects of successful explorations. The principal mines are those of iron, silver, lead, copper, and manganese, gold being occasionally found. This range of primitive and transition rocks rises from the centre of the vast secondary plain, bounded on the south by the primitive formations of Saxony, on the east by those of transition which extend to Dillenburg, and on the north by the vast slopes composed of the alluvium of the Baltic and the Atlantic. Its greatest length is fourteen and a half leagues, and its breadth from Wernigerode to Illfeld is six leagues.

The Hartz terminates with the commencement of the secondary plains, having on the north the villages of Goslar, Ocker, Neustadt, Isedburg, Blankenburg, &c., and on the south Stolberg, Ellrich, and Osterode.

The mountains forming this group are not celebrated for their height, the Brocken being the most elevated (three thousand five hundred feet), known as the site of the exploits of the imaginary Faust, and justly celebrated for the magnificent and extensive view enjoyed from its summit, extending on the north beyond the Elbe. Nothing can be more characteristic and melancholy than the aspect of these dreary plains, which occupy

the middle elevation of this range; they are singularly contrasted with its beautiful and picturesque valleys.

That upon which Clausthal and Zellerfeld are built may be taken as an example; it is covered with a meagre swarth, scarce sufficing the few cows that supply these places with milk; for the other provisions of life, the inhabitants are forced to have recourse to the lower and more prolific surrounding country. The earth beneath appears to have grown rich at the expense of its surface; the Creator, banishing all other sources of happiness and wealth, has apparently placed everything in subordination to the mines, as if they alone were sufficient for the wants of man. The aspect of the country is sterile; the potato appears to be the only vegetable which this ungrateful country fosters. The clouds, which, hurried on by the winds, are here constantly passing, render these places disagreeable and unwholesome. The sun scarcely ever appears through the dense mist that lowers over and about Clausthal. The temperature is that of the lower countries during the winter.

The curious who visit the Hartz generally ascend the Brocken* to enjoy the beauties of the setting and rising sun. The mountain, as well as the inn, which is constructed on the peak, appertains to the Count of Wernigerode, to whom a list of the names, professions, &c. of those who may have passed the night there is daily sent, bearing such remarks, complaints, &c., as those who attach their names to it may deem proper to make, being similar to the skyds-book used in the Scandinavian peninsula. A view from the summit of this mountain is as essential to the geologist as it is gratifying to the lover of nature, inasmuch as this is the only point from which a correct idea of the disposition of this interesting group can be attained. The Hanoverian Hartz is divided into sixteen mining arrondissements or districts (Bergweihzuge); six of these are in active operation. A number of the villages are distinguished by the enjoyments of certain privileges, and are termed mine cities (Bergstadt); they generally owe their origin to the exploration of a vein. Thus the mines near Clausthal and Zellerfeld were opened in the year 1600, and the above places were then founded. The veins at Andreasberg were discovered in 1520, and the cities founded the following year. They are the following:—Clausthal, Zellerfeld, Wilderman, Grund, Sausenthal, Andreasberg, and Altenau.

The mines and works are under the direction of a council, which holds its meetings at Clausthal, where there is a school of mines possessing an extensive mineralogical cabinet, and a remarkably fine collection of models of the different machines used in the working of mines. Those minerals found in the

* The scene of Faust and Der Freischutz.

mines, and possessing a certain intrinsic value, are sent to the school, where they are taxed and exhibited for sale.

The administration of the mines is worthy of the highest praise; the different situations are accorded only to those persons who have proved their capability, by long and particular practice, seconded by theoretical information respecting their occupation. Each individual has his immediate calling, and gives himself entirely to the acquisition of that knowledge which his department demands. Thus, there are especial engineers for the iron-works, for those of lead, for the machines, &c. Honesty and civility characterize those employed, and there is scarcely a workman, who, if questioned concerning anything that regards his duty, will not answer with promptitude, attention, and precision.

Considering the natural situation of this district, a temperate climate could not be expected; it is cold and wet during the winter, the thermometer frequently descends to 32°, and never rises above 30° during the summer. Thus the inhabitants, with little interruption, keep a fire in their respective apartments during the whole year. The mines, then, are the only primitive sources of industry in the Hartz, and there is not an individual who is not dependent more or less upon them. Thus a state of society is presented differing in this respect from that of any other part of the world. The forests are subservient to the wants of the mines, or to subsequent operations; and the administration, being a distinct one, consults the wants of these establishments before granting to individuals the use of combustibles.

The silver-mines are generally found in the western part of the range, supplying the works that are constructed in the immediate vicinity for the treatment of the ore. The principal are those existing near Goslar, Clausthal, Lankersthal, and Andreasberg. The most remarkable is the vein which extends from Wildermen to Clausthal, traversing the city of Zellerfeld, a distance of about three miles. This vein, as are the others, is divided into a certain number of parts, termed concessions, by planes dissecting the vein perpendicularly. These concessions are let out, and generally wrought by companies. Each mine has thus a distinct administration, all operations being practised within certain limits subordinate to the decrees of the general council of mines, which hold their sittings at Clausthal, general utility being their primary consideration. The shafts Caroline Doreathea, Du Wilhelm, and Rozenlof are sunk upon the above remarkable vein. The ores from the environs of Clausthal contain from one to four ounces of silver per quintal. The objects of the different explorations at Andreasberg differ entirely from those already mentioned, in the nature of their ores, in the richness of those that are similar, and in the manner in which they

are found. There exists as great a difference between the ores found at Andreasberg and those of Clausthal as there is between the physical geography of the country around these respective places. The veins are numerous, and are not celebrated so much for their length as for their extreme richness. They vary in breadth from fifteen to twenty-three inches, differing in this respect from those at Clausthal. It appears that the ores increase in richness in proportion as they descend. A remarkable instance of this fact exists in the celebrated mine of Sampson, which is incomparably the deepest shaft in the Hartz; the lowest gallery being fifty-five feet below the surface of the Baltic, and 333 lachlers (about 2,229 feet) below the surface of the earth. The descent into these mines is practised altogether by means of ladders, one-half the main shaft being separated into distances of about twenty-five feet by means of platforms, thus rendering the fatigue more supportable, and the descent less dangerous. The vein upon which the Sampson is constructed is limited on the N.W. by the vein termed Neufang, limiting in its turn the vein Greade-Gotles on the S.W. A remarkable fact observed here is, that the richness of the vein is not increased at the point of junction of two veins; on the contrary, the crossing vein always becomes barren beyond the joining point. After the two mines already mentioned, the most celebrated are those of Andreasberg, Claufrederick, &c., having a mean direction from N.W. to S.E., occasionally crossing each other at different and appreciable angles.

The Ramelsberg is an elevation of about 1,230 feet above the plain upon which Goslar is situated. This mountain, which bears the same name as the mine, forms a part of and limits the argillaceous slate on this side of the range, passing often into grauwacke. This rock has a mean inclination of near forty-six degrees, like that of the metallic deposit, which has been successfully wrought since the year 968. The cropping out of this immense bed is seen about half-way up the mountain, where it has but little capacity; but it increases as it descends, having a thickness at the bottom of upwards of 180 feet. Near the centre the depôt is separated, and forms two beds; the inferior has the least capacity, and is nearly exhausted. The greatest capacity of this deposit exists at the point of separation. The mass is abruptly terminated with an inclined plane, forming an angle of forty-five degrees with an horizontal line drawn from the direction of the base. Disseminated masses of the gauque become frequent; and, what is remarkable, the richness of the ore diminishes as these masses of rock become more abundant; all these appearances coinciding to announce the approaching dissolution of a source of wealth, on which the inhabitants depend for their existence; notwithstanding, an immense portion of ore still exists awaiting extraction.

On account of the nature of the ore, which is compact and excessively hard, the system of extraction here employed differs from that practised in any other part of the Hartz, and perhaps in the world. To give an idea of the obstacles with which the miners employed at the Ramelsberg have to contend, we give the following extract of a process-verbal, drawn up in 1808, to prove the impossibility of applying the ordinary mode of extraction (by means of powder). "The ore, on which this assay was commenced, was compact, very hard, and chiefly composed of iron and copper pyrites. A workman was employed eighty-eight hours in boring a hole four inches deep; during this time 201 boring-augurs were rehardened, and twenty-six were remounted with steel, and 126 were entirely destroyed. The method of working actually employed is by fire, which has a powerful disaggregating action upon the ore. The heat is applied by means of a pile of fir-wood, built up from the floor to the ceiling of the gallery; this wood is of easy ignition, and, like all other resinous wood, produces a great deal of flame; some time after the fire is put to the pile, a continual cracking is heard, produced by the disaggregation and falling of the detached ore. Without doubt this separation is due chiefly to the expansive force of those matters capable of taking a gaseous form, as arsenic, sulphur, water, &c. After the temperature has sufficiently fallen, the workmen arrive and separate a great deal of ore attached, but not detached by the fire, notwithstanding the great action of heat. The use of powder cannot be thus entirely replaced, for there is a certain part of the gallery, the inferior angle, upon which the flame has little or no action, and the employment of powder is of absolute necessity, which enormously increases the expenses of extraction. All expenses paid for the extraction of forty tons of ore, by the method of blasting, cost from thirty-eight to forty Prussian dollars, and the same quantity, by means of fire, twelve dollars and a half. The Prussian dollar is equal to 3*s.* 4*d.* sterling. Thus, if by any means the combustibles in the Hartz should be destroyed or become scarce, as not to permit of being thus employed, either some other mode of extraction sufficiently economical should be substituted, or the ruinous necessity of abandoning the Ramelsberg will be a necessary consequence. The quantity of ore extracted per week is about forty tons."

Freyberg, in Saxony, is one of the most celebrated mining towns in Germany. The practical branches of mining, the customs, manners, and even the legislation of the mines, are transmitted from father to son, in such a manner as to give to the profession a durable stability, which has continued from remote periods until the present day. The possession and the right of exploring the mines were formerly absolutely vested in the Crown; at a later period, the same rules were adopted with

regard to the smelting-works; afterwards the mines were allowed to be worked by private individuals, although their administration was subjected to the Government control, which remains in force until the present day. The consequence of this legislation has had this good effect—that the mines have been preserved from rapacious and unfair explorations; many of them being of great antiquity, would have been long since exhausted and abandoned, if the proprietors had worked them solely with a view to present profit, instead of considering their ultimate development and durable existence. The disadvantages, however, are daily felt, not only in the number of officers employed to enforce these regulations, but likewise in the multiplicity of ordinances and laws which have been promulgated at different epochs. For a number of years, the legislative body of Saxony have intended to ameliorate and reform those laws, but as yet have arrived at no practical result or definite determination, which has tended to keep the mining interest in a visible state of depression. Although the exploration of the mines is carried out according to the most practical and scientific methods, a due regard being paid to economy, the system, with its vexatious interference and regard to forms and trivialities, has many and great evils. Decisions which are determined in other countries by a body of directors are made in Saxony by a variety of councils, which are the Ministry of the Finance Department, the Ober-Berg-amt, the Superior College, the Council of the Smelting-Works, the College of Mines, who are again assisted by a corresponding number of officers, whose duty it is specially to direct and watch the manipulative departments in the mines and smelting-works. Among the officers are men possessing great abilities, who have studied the theory of mining and smelting in the celebrated academy of Freyberg, and have undergone a practical education in the works. It is scarcely necessary to mention the names of Werner, Charpentier, Von Herder, Plattner, Weisbach, Reich, and Breithaupt, who were all students at this academy. There are about 126 mines in the vicinity of the city. The veins traverse gneiss rocks, and are generally of quartz, calcarious fluor spar, and sulphate of barytes; the metallic ores are argentiferous sulphuret of lead, red silver ore, argentiferous grey copper ore, zinc, and some other ores of copper and lead, with a small quantity of nickel and cobalt. The Himmelfürst is situated about two miles south-east of Freyberg. The elevation of the surface above the level of the sea is 1,346 feet; to the bottom of the mine about 300 feet. There are five veins in this mine; the principal vein (*teichflache*) is from 1 ft. 6 in. to 3 ft. in width; the others are from 6 to 12 in. wide. The direction of this vein is nearly north and south, and its underlay is west about 3 ft. per fathom. The ores consist of sulphuret of lead, native silver, sulphuret of silver, and red

silver; their produce is from 6 to 7 oz. per quintal of 100 lbs., equal to $3\frac{3}{4}$ or $4\frac{1}{2}$ parts in 1,000 parts of ore, or from $\frac{3}{8}$ to $\frac{1}{2}$ per cent. The vein-stone is quartz and pearl spar, and the ores are accompanied by blende, spathose iron, and arsenical pyrites. About 700 miners are employed, of whom 600 work underground. In some of the mines there are above 100 veins; nearly every mine has its own administration; in general they are divided into 128 shares (*kuxe*), which belong to private adventurers. The levels in all the mines are constructed and kept in repair and order by the Government; the expense, to which each mine is bound to contribute, is levied from a rate, fixed according to the quantity of silver contained in the ores raised. This varies from $\frac{1}{4}$ oz. in the quintal to 60 per cent. or more of silver; the average in general is from 1 to 3 oz. in the quintal. The ores are delivered to the Government works, where they are partly smelted and partly amalgamated. The smelting-works purchase them according to the contents, which are fixed by assay with the blow-pipe, founded on a system which has been proved to be invariably correct, and conducted with a mathematical exactitude. This improvement has principally been owing to M. Plattner, who has practically brought into use the importance of the blow-pipe, not merely as an instrument of chemical recreation, but a correct standard of assay. The blow-pipe, with its apparatus, forms a complete portable laboratory, and is a useful guide to both the smelter and miner. The different processes are the raw fusion (*fondre cru*), the fusion of the lead, the cupellation, the refining of the silver, and the reduction of the litharge. Not only in Freyberg, but in all the smelting-works of Germany, the preference is given to smelting lead and argentiferous ores in high furnaces; those at Freyberg are from 13 to 14 ft. high.

The raw fusion (*fondre cru*) is performed with a double purpose—first to concentrate the small quantity of silver disseminated in the mineral, which without this process would be useless, and to receive a substance of precipitation for the manipulation of the fusion of the lead. The minerals which are fused contain a quantity of different earthy matters, and the metallic ores are principally pyrites of iron, with $\frac{1}{4}$ to $1\frac{1}{2}$ oz. of silver to the quintal, 2 to 4 per cent. of lead, and $\frac{1}{8}$ per cent. of copper. It is necessary to pay particular attention, that, in smelting the slag, there are more single silicates, until the formation of the bisilicates. The matte contains principally sulphureous iron, with about 3 oz. of silver to the quintal, 4 to 10 per cent. of lead, and $1\frac{1}{2}$ per cent. of copper. Afterwards this matte is roasted in the open air, laid on a bed of wood. This burns with great facility, as it contains nothing but sulphureous metals. A roaster generally contains from 300 to 400 quintals of matte, and burns from four to eight weeks, until it goes out. About a

third part is roasted, which lies at the bottom; that on the top is placed in another roaster, to undergo the same process. By this roasting a great quantity of the sulphur is volatilized, and some of the oxides are freed from the metal.

Recently the mines have produced such quantities of these ores, that another method has been hit upon to reduce the silver. For this purpose they have commenced smelting in reverberatory furnaces, as used in England for smelting copper ores. The matte is roasted and smelted a second time to concentrate the silver. It is expected that this method will produce favourable results; and it is intended to be adopted for the future in heating these ores.

The Fusion of the Lead.—For this it is necessary—first, to submit the ores containing lead and silver to a roasting in the reverberatory furnace to volatilize the sulphur; when about to be smelted, a third part of the mineral, a third part of the roasted matte, and a third of the scoria, is taken; from this slags, which are nearly single silicates, should be obtained; a portion of the oxidulated iron which is in the matte combines with the earthy minerals to form a siliceous slag; another part of the oxidulated iron is reduced by the process of smelting, and combines with the sulphur contained in the mineral and the matte, and forms sulphureous iron (*schwefeleisen*), so that another matte is obtained, consisting of sulphureous lead (*schwefelblei*), sulphureous copper (*schwefelkupfer*), and sulphureous silver (*schwefelsilber*), &c. At the bottom of the melted mass is the metallic lead with the metallic silver; on this is the matte recently formed, and above all the scoria; sometimes, but this depends on the quantity of the ores, a second matte is smelted, containing arsenical nickel, which has a different specific gravity to the ordinary matte, so that the separation of the mattes is not difficult. In the smelting in general, some products of the lead obtained from cupellation are added.

By this process, two valuable products are obtained—lead in combination with silver, and the matte. This latter is treated several times, until these metals are extracted, and nothing remains but sulphur, iron, and copper. From this, by degrees, a matte of copper is formed, from which the pure copper is extracted. The separation of the silver from the lead is made by cupellation. The cupellation furnace has a fixed foundation, with a moveable cap, or elbow, of iron. The smelting-bed is made every time by powdered clay and lime. At the side of this furnace is the fire-furnace; the blast, which is propelled by two pair of bellows during the cupellation, should be placed in a rectangular direction towards the flame. Firstly, the impurities contained in the lead separate, and are evaporated by a chimney from the furnace. The blast gives its oxygen to the liquid lead, to form litharge (oxide of lead), and this process is

continued until the silver appears; the fire is then extinguished; water is poured in the furnace to prevent the silver volatilizing. As it is impossible, in a furnace of these dimensions, to obtain the silver entirely pure, it is necessary to refine it; for this purpose they use small plates, in which a bed of the same formation is made, as in the operation described above. By means of the blast, charcoal, and a mantle of iron which surrounds the whole, the silver is made fluid; the mantle and the charcoal are then removed; wood is put in front of the blast to cause a direct flame. From time to time, an assay is taken with an iron bar, and the silver is pure, if the little assay, in cooling on the bar of iron, throws out different prismatic colours, which appear to resemble the refraction of the rays of light. In one of these plates about 25 lbs. of silver are refined. The production of this smelting, and that of the amalgamation-works, is annually about 70,000 to 80,000 marks of silver, of the value of about 140,000*l.* sterling. The production of lead is about 30,000 quintals, of the value of about 20,000*l.* sterling.

The reduction of the litharge is performed in one of the high furnaces, but not with coke, which is generally used: charcoal is the fuel employed, as the cokes are not sufficiently good and pure. This process is very simple, as it is only to burn the oxygen of the litharge with vivid charcoal until nothing but the metallic lead remains. The other system of extraction is conducted with mercury, in the amalgamation-works. The metals freed from lead are submitted to this process. They are mixed with chloride of natron (*chlornatrium*). Afterwards they are calcined. It is necessary to pay particular attention to this, in order to volatilize as much as possible the foreign substances, such as sulphur, zinc, arsenic, &c.: a combination of silver is formed with the chloride. The natron combines with the sulphur, and forms a sulphureous natron. The amalgamation is so conducted that the balls which are formed in the heat can be prepared, if necessary, for another calcination. The powder itself is ground in mills, and put in barrels; water, metallic iron, and mercury, are added; these barrels are turned or rolled for about twelve hours; a current of galvanism is excited by this movement, which causes the chloride to leave the silver, which enters into combination with the mercury, while the chloride unites with the iron and forms chloride of iron. At the bottom of the barrels, the amalgamation, or combination, of silver and mercury is found. A portion of the mercury, which is not chemically combined with the silver, and which forms with the mercury a crystallization, with the crystals of the silver, is placed in an iron retort, well closed, having only one aperture, with a *tuyère*, which is conducted into a receptacle of cold water; the fire is made round the retort, so that the amalgamation becomes red hot; the mercury being easily volatilized,

escapes by the *tuyère* into the water, there it forms vapours, which are condensed to metal. The residue in the retort is the refined silver; the silver obtained by the process of amalgamation always contains copper; it is impossible to avoid this. This is not of much importance, as, in all the silver which is coined, it is necessary to add an alloy of copper to the pure metal.

THE TIN TRADE.

The production of tin in the county of Cornwall is well known to be of the greatest antiquity, it being mentioned by Herodotus, who lived 450 years A.C. Diodorus Siculus, who flourished a short period after, supposes the Scilly Islands to be the Cassiterides. It has not, however, been authentically ascertained whether the Phœnicians and Grecians interested themselves in the management of the mines in Cornwall, or that they merely purchased and exported the tin after it was raised. The Saxons, who had no authority in Cornwall until after it was entirely conquered by Athelstan, neglected the tin-mines; and it was not until after the Norman conquest that they were prosecuted with any degree of vigour. In the reign of King John, their production was, however, so small, that the farms of Cornwall amounted to no more than 100 marks per annum; according to which valuation, the Bishop of Exeter received, in lieu of his tenth part, the sum of 6*l.* 13s. 4d.; while those in Devonshire amounted to 100*l.* yearly. At that period, our miners must have made some progress in their profession, as we find, shortly afterwards, according to Matthew Paris, that a Cornishman, who had fled to Germany on account of a murder, first discovered tin there in the year 1241, from which period the mines of Schonfeld date their origin. About this period, the mines were worked in Galicia and Portugal; but, on the expulsion of the Moors from those countries, this, as well as every other branch of industry, languished, and was ultimately totally abandoned. About the commencement of the sixteenth century, mention is first made of Malacca tin; but it was not imported into Europe before the middle of the seventeenth century.

In the year 1693, in consequence of a fall in the price of tin, the tinners of the counties of Cornwall and Devon published a proposal for the redress of their grievances, and the raising of

the price of their tin. It states that, "in the year 1692, according to the coinage-books, only 11,174 pieces were coined; the duty, being then 4s. per cwt., amounted that year to 5,449*l.* 17s., making only 27,249 cwts. raised; that quantity, sold at 50s. per cwt., would realize 69,222*l.* 10s.; out of this was to be paid to bounder and lord of the soil about one-fifth, which would amount to 13,844*l.* 8s.; the charges of smith's work, timber, ropes, and candles, were computed to each man, in a year, about 20s., which, for 8,000 men, would be 8,000*l.*; and, supposing the dressing and stamping to make every cwt. of tin come to 2s. 6d., it amounts to 3,406*l.* 2s. 6d.; the charges of refining that year's tin, at 30s. the tide, computing 1,000 of tin to be refined in each tide, come to 2,725*l.* 7s. The charges of carrying and the expenses at the refining or blowing-house, at 10s. the tide, the whole sum to be deducted comes to 28,884*l.* 9s. 10d., which deducted, there remains to be divided among 8,000 tinners but 40,338*l.* 0s. 2d., which comes to 5*l.* 0s. 10d. and about half a farthing to each tinner, and this is all each tinner hath to maintain himself and family, and for his whole year's hard labour, not only under ground, but under God knows how many grievances.

"The Cornish factors and others are not the only causes of the poor tinners' misery—the Cornish *lawyers* must come in for a share too; for as the factors grind the poor tinners, to gratify the principal traders, and thereby increase their commissions, so the lawyers (upon the discovery of a rich mine), taking the advantage of the tinners' ignorance in the Stannary laws, they being not set forth, and published in print, do use all means (by way of pretended justice) to right those clients against the bounder, the landlord, or the fellow-adventurers, when, in truth, it is in the main a contrivance to make themselves masters of those mines, and the profits thereof, and the tinners the slaves, only to dig the ore for them; and this they sooner do, because the fees are so great, and the lawsuits which they create so dilatory, that in proportion they exceed all other grievances; whereas the tinners' privilege, as I am informed, is to have their proceedings at law altogether in English, and, upon payment of one penny only, they are at liberty to appear in person, and to speak and act for themselves, that their causes may be the sooner ended. The quantity of unwrought tin transported from London, in the year 1692, amounted in the whole to 61,413 cwts., besides the unwrought tin transported from other places.

"The reasons for raising the price are because the public use of silver plate is so much abated in the nation—because tin improved by art is next in nature to gold and silver; and it is the honour and interest of the nation to refine tin—it being our own commodity. The higher the price of tin, the more

it will be in fashion; the more it is in fashion, it will be refined; the more it is refined, the more fitter it will be for plate; the more tin there is in plate, the more silver we shall have in money—the more money we shall have to lay out in the most refined and fashionable pewter. The finer the pewter is in quality and fashion, the higher will be the price of tin. The higher the price and quality of tin, the greater quantity will be consumed; the greater the consumption is, the better it will be both for the rich and poor. The poor will get more wages, and the rich more wealth; *for all markets are governed by the first market price;* and as the quantity, quality, and price of tin shall rise, the more it will be for the honour and interest of the nation in general; and the counties of Cornwall and Devon, in particular, will be the better enabled thereby to serve their country, in mind, body, and estate. The better, therefore, to prevent the Cornish factors underbuying one another, and bringing down the price of tin, to the prejudice of the public, that a law may be made here, that no one shall buy or sell tin under 3*l*., 3*l*. 10s., or 4*l*. per cwt.; for the higher the price has been, the better the commodity goes off. The Dutch do not import so much tin from the East Indies in twenty years as the county of Cornwall in one. The tin brought by them is from the kingdom of Siam; the principal places whereof are Jahore, Perah, and Quedah; and, where it is sold by weight, called a bahar, which is equal to about 390 lbs. avoirdupoise. In Siam it fetches about 12*l*. sterling per bahar.

"The Dutch have made some attempts to engross this commodity, and did contract with the King of Siam for the whole quantity, at the rate of 9*l*. per bahar; and they obliged the King of Perah, by force, to sell all he has to them; and they used formerly to block up the port of Quedah, to prevent its sale there to any but themselves. Germany, by its nature and situation, cannot afford so good tin as England, nor so cheap, by as much as 3*l*. per cwt., and when tin was above that price, we have supplied that country as well as Holland. The miners' wages being fallen from 30s. to 15s. a month, great distress has been the consequence; the only way in which to remedy it, is to make a law to prevent the price of tin falling at least under 3*l*. per cwt.; and though it is the interest of the factors, the pewterers, and merchants to buy cheap and sell dear, yet where the private gain doth not occupy the public good, there will be little commonwealth to carry on a vigorous war; and as Britain hath its name from the tin which was first found in the county of Cornwall, we cannot begin to regulate trade, and to raise the nation, better than by trying all experiments upon that useful commodity, whereby we may raise the kingdom to a pitch of honour and empire, which Old England (in all its

glory) was never able of acquiring." The proposal concludes with this appeal to the king and kingdom.

" Henry the Eighth, of this great nation,
Began the famous Reformation,
His daughter, Queen Elizabeth,
Finisht the second ere her death;
And now the king is almost rife,
To cut the third out to the life,
And raise this nation to that stature,
For which it was cut out by Nature,
And 'twas the nature of our white tin,
From whence it hath the name of Britain."

Though it was impossible for the legislature to regulate the price, they wisely opposed the king, who wished to please his Dutch subjects; and protection was prudently retained. Under this system, the Cornish mines progressively increased; and, previous to the discovery of the copper-mines, were considered the most important branch of industry in the county.

The tin-mines of Banca are said to have been discovered in the year 1710-11. These are in general worked by Chinese. In the year 1776 the metal was raised at the rate of five rix-dollars the 125 lbs. In the year 1778, the Dutch East-India Company brought into Europe 700,000 lbs., of which 100,000 lbs. were sold in Amsterdam for home consumption. The tin sold in Amsterdam between the years 1775 and 1779, amounted, in the whole, to 2,421,597 lbs. The mines of Banca produce now about 3,000 tons yearly, although at some periods, when the demand has been great, the production has increased to 3,500. The cost of mining and smelting is supposed to be about 40*l.* per ton: 890 tons of tin are annually produced in the island of Ceylon, the cost of which averages, free on board, 48*l.* per ton. The cost of smelting a ton of tin in England has been calculated to be 78*l.* 17s. 6d.—viz. $1\frac{1}{2}$ ton of ore (say), 75*l.*; $1\frac{3}{4}$ ton of coals, 10s. per ton, 17s. 6d.; labour, wear and tear of furnaces, &c., 3*l.* A loss of 5 per cent. of the metal is said to occur in the reverberatory process — that in the blowing-houses is said to be 15. These last are principally used for producing grain-tin, or, as it is called by the French, *étain en larmes*, which is produced from stream-tin, that from the tinstone forming block tin. The reverberatory furnaces are about 6 ft. by 12 ft.; about 600 cwts. of average ore will produce 350 of tin. Culm is used as a flux; wood was formerly the only fuel; in the year 1680 coal was first used. From the absence of any authentic records, it is impossible to say what the exact production of the Cornish tin-mines may be. In the year 1817, 4,120 tons were coined; in 1820, $2{,}773\frac{1}{2}$; in 1827, 5,316; in 1829, 4,396; in 1834, 4,180; in 1835, 3,899. At the present period, it may be calculated that from 6,500 to 7,000 tons are annually raised; at the com-

mencement of the last century from 1,300 to 1,500 tons were the average yearly returns. In the year 1750 the returns were about 2,800 tons, and the next fifty years the produce varied from 2,000 to 3,000 tons. The price, since the commencement of the present century, has varied considerably. In the year 1800, it was 5*l.* 1s. per cwt., and steadily increased until the year 1806, when it realized 6*l.* 6s. In the two subsequent years it had a tendency to decline; but in the year 1809 the price was 6*l.* 2s.

Owing to the war and the blockade of the continent, from this year it further increased. In 1810 it fetched 7*l.* 17s. 6d., the highest amount it ever yet attained; 1811, 7*l.* 11s. 6d.; 1812, 6*l.* 8s.; 1813, 6*l.* 14s.; 1814, 7*l.* 16s. 6d.; 1815, 7*l.* 6s. On the termination of hostilities, it fell, in the succeeding year, 1816, to 5*l.* 14s. 6d.; in 1819 it was 3*l.* 16s. 6d.; in 1823 it had again risen to 5*l.* 5s.; in 1825 it had fallen to 4*l.* 9s. 6d.; and at the commencement of the year 1830 it was sold at the rate of 3*l.* 13s.; in 1832, 3*l.* 12s. 9d.; in 1835, 4*l.* 11s. 6d.; in 1836, 5*l.* 9s. 6d.; in 1839, 4*l.* 8s. 6d.; in 1840, 4*l.* 2s.; in 1844, 3*l.* 13s.; in 1847, 3*l.* 13s.; in 1848, 3*l.* 19s.; in 1849, 4*l.*; while its present price, according to the last quotation, is 4*l.* 5s. In 1790, the quantity of British tin exported was 2,910 tons; in 1800, 1,782 tons; during the war the average exported was about 1,000 or 1,200 tons annually; in 1825, 1,712 tons were exported; in 1836, only 558. The quantities of foreign tin imported were—in 1815, 325 tons,—of this 198 were exported; in 1824, 319 imported, 235 exported; in 1825, 211 imported, 235 exported; in 1832, 1,460 imported, 1,086 exported; in 1838, 1,536 imported, 1,451 exported. In the year 1846, 20,306 cwts. imported, 21,038 exported; in 1847, 23,307 imported, 11,471 exported; in 1848, 5,975 imported, 834 exported; in 1849, 35,545 imported, 8,940 exported. The exports of tin, the produce of Great Britain, were—in 1848, tin unwrought, 35,946 cwts.; in 1849, 35,267. The declared value for the last four years, of unwrought tin exported has been, in 1846, 107,456*l.*; in 1847, 159,466*l.*; in 1848, 143,085*l.*; in 1849, 141,577*l.*, making a total value of 555,584*l.* That declared on tin plates was—in 1846, 639,223*l.*; in 1847, 462,889*l.*; in 1848, 532,142*l.*; in 1849, 711,649*l.*, making a total value of 2,345,903*l.* Owing to the prohibitive duties in France and Belgium on tin plates, our manufacturers do not export so largely to those countries as they would under a system less restrictive; a great quantity of the Banca tin is used in the United States.

The countries which imported tin to England last year, were—Singapore, 136 tons; Holland, 74; Belgium, 27; Spain, 21; Peru, 18; China, 15; British India, 7; Cape of Good Hope, 1—making a total of 299 tons. The three countries to which we export the greatest quantity are Russia, France, and Turkey.

Of foreign tin, 4,698 cwts. were entered for home consumption in 1848, and 16,715 cwts. for the same purpose in 1849. There can be no doubt that, were the duty on foreign tin repealed, our tin-plate manufacturers would be able to enlarge their already enormous trade, as the quantity of unwrought metal now taken by the French and Russians is used for their own manufactures. In spite of the fiscal regulations imposed in those countries, our manufacturers are enabled to compete with them ; and were those governments to release their duties, would, in a short period, by their superiority of workmanship, undersell them in their own markets. The repeal of the duty here, while it caused the ruin of our home mines, would be only of benefit to the clique of manufacturers. The gross amount of duty received in the year 1848 was 1,438*l.* ; in 1849, 1,622*l.* ; being so inconsiderable, that as an article of revenue it cannot be taken into calculation. It is so far important, that so long as this is retained, it precludes the Dutch and others from importing the metal, to the detriment of our native industry. In 1838, the government, by abolishing the coinage-duty, freed the mines from a grievous impost, and it is to be hoped that they will pause before they take from them that protection which is vitally necessary to their well-being and positive existence.

The smelting trade is confined to a few houses, who generally are interested in the mines. The following are the names of the works and their several proprietors :—Calenick, Messrs. Michell and Co. ; Carordras and Treloweth, both belonging to Messrs. Daubuz ; Charlestown House, Messrs. H. I. Enthoven and Sons ; Angarrach and Chyandour, Messrs. Bolithos ; Trethellan and Millineur, Messrs. Williams, Harvey, and Co. ; Taniar Union Company, Bissoe, Messrs. Tregoning and Co.

THE QUICKSILVER MINES OF ALMADEN.

These mines belong to the Spanish crown, and are situated in the province of La Mancha, near the confines of Estremadura and Cordova. The town, called Sisapona Cetobrix by the Romans, and Almaden by the Arabs, is built on a hill rising gently between two mountain ridges, evidently ramifications of the Sierra Morena, which commences near the eastern confines of La Mancha. The town contains a population of over 7,000 souls, including the garrison and six adjoining villages, and is administered under a military *régime*. There is also a director of the mines, presiding over a separate department. The only

remarkable edifices in the place are the hospital and a prison for convicts.

So early were these mines known to the ancients, that Theophrastus, who lived 288 years before Christ, speaks of their produce, as also does Vitruvius, a contemporary of Augustus. Pliny says that they are situated in Bætica, which is substantially correct, Almaden being the last town in La Mancha, and separated from Cordova only by a rivulet. The same historian further remarks, that these mines were kept constantly closed, and only opened by special license from the emperor, adding, that as soon as the supplies required for the consumption of Rome had been obtained, the approaches were carefully shut. These minute particulars warrant the inference that the Romans established works there; but no vestiges now remain, so great is the change which the ground has since undergone. The Romans entertained the idea that mercury was dangerous, owing to its poisonous qualities, and yet their matrons used it to beautify the skin. Their painters also mixed it in their colours; but the apprehension of an improper use being made of it may have given rise to precautions in order to prevent its general circulation.

During the dominion of the Arabs in Spain, these mines lay neglected. There is indeed reason to believe that they entertained the same prejudices regarding mercury as the Romans, and, consequently, seldom used it. To them, agricultural pursuits were more congenial than mining, and in those days, moreover, quicksilver was not a marketable commodity in the commerce of Europe. So little aware were the Spaniards themselves of the valuable resource which they possessed in this article at home, that South America had been discovered nearly two centuries before Almaden supplied the fluid mineral used in the amalgamation of silver ore. At first the Mexican miners consumed quicksilver obtained from Peru, but the supply being found insufficient, recourse was had to Austria. The quicksilver mines of Idria were not discovered till the year 1497, and then by accident. A cooper happened overnight to place a new tub under a dripping spring near his workshop, for the purpose of tightening the joints, and next morning was surprised on seeing at the bottom a shining fluid, with the nature of which he was wholly unacquainted. Struck with the phenomenon, he repeated the experiment till he had collected a sample in a phial, with which, full of hope, he trudged off to the nearest town, and submitted it to the inspection of a chemist. It proved to be quicksilver, when the Crown claimed the mine from which it issued, and for several years afterwards, in Europe at least, monopolized the supply.

The Spanish miners in Peru first used quicksilver in the separation of the precious metals—a discovery which is said to

have taken place about the year 1571, and is generally attributed to Pedro Fernandez Velasco, at the time governor of Huancavelica. At this place a quicksilver mine had been discovered in 1566, in consequence of a vermilion stone being found on the person of an Indian, with which he and his tribe painted their faces, and it was from this mine that the South Americans obtained their first supplies. When no more quicksilver could be procured from Peru, the Mexicans became, in some measure, dependent on Europe for an article essential in the preparation of their ores—a state of things which the Madrid cabinet gladly encouraged.

The demand increasing, and the outlay of money annually paid to Austria being found extremely onerous, the Spaniards at length turned their attention to the forsaken mines of Almaden. Labourers were set to work, and for several years these mines, together with the silver one of Guadalcanal, situated in Estremadura, near the Sierra Morena, twenty-three leagues from Madrid, and fifteen from Seville, were held under contract by the brothers Fuggers, Germans, and in Spain called Fucares, who, in these undertakings, gained a large fortune, which they realized and then returned to their own country, where they rose into notice. It is believed that the history of these enterprising merchants was not altogether unknown to the present mortgagees when they made their contract. During the administration of the Fuggers it was that the Spanish Government learned the value of the Almaden hill, and at the expiration of their lease the mines devolved to the crown. (Mark and Christopher Fuggers, natives of Augsburg, were in great favour with the Spanish monarchs of the Austrian dynasty, and from Philip II. obtained their first grants. Their descendants are now princes, the head of which is the Prince of Fugger Babenhausen, and possess large estates in Suabia. They are also allied to some of the first families in Germany. The fortune which they amassed in Spain gave rise to the proverbial expression, "*Ser rico como un Fucar*" (as rich as a Fugger), which occurs in "Don Quixote." In Madrid there is still a street bearing their name.) The galleries were repaired, and furnaces on a new principle introduced, the invention of which is attributed to D. Juan Alfonso de Bustamente. So valuable was this improvement considered, that, in 1719, M. Bernard Jussieu presented a memoir on the construction of the new or reverberatory furnace used at Almaden, to the Academy of Sciences at Paris, which led to their adoption in the Hungarian mines.

The mineral wealth of this interesting hill was not, however, scientifically explored till towards the middle of last century. In the year 1752, Mr. William Bowles, an Englishman, and a naturalist of some eminence, happened to be at Paris, where he became acquainted with D. Antonio Ulloa, one of the distin-

guished navigators who, in 1735, had been commissioned by the Spanish Government to make astronomical observations in South America, and who, jointly with his brother, had just completed the publication of a large edition of their well-known work of travels. Pleased with his society, and thinking that Bowles would be an acquisition in a country where public attention was directed to improvements in mineralogy, more particularly at a moment when the want of practical men was severely felt, Ulloa recommended our countryman to the Spanish ministry, by whom he was invited to Madrid and employed as a professor. Several pupils were placed under his care, many of whom distinguished themselves in various departments of science.

Among these were D. Jose Solano and D. Salvador de Medina. The first rose to the highest naval rank, and, it will be recollected, was murdered by the populace of Cadiz, where he held the appointment of governor at the time the French invaded Spain. The second died in California, where he had been sent to make astronomical observations, and especially to observe the passage of Venus by the sun's disc. D. Pedro Saura, a learned advocate, who died in Madrid, also studied natural history under our countryman. Wishing to turn his knowledge and experience to some account, Bowles was commissioned to make excursions into the interior, for the purpose of surveying the mines, and suggesting improvements in the method of working them. His first trip was to Almaden, accompanied by his pupils, where he executed his commission to the satisfaction of his employers, by recommending various improvements, both on the score of science and economy, which, under his superintendence, were carried into effect.

Of these, as well as of the locality, he gives some account in his "Introduction á la Historia Natural y á la Geografia Fisica de Espana," printed at Madrid in 1775, a work at the time held in such high estimation, that Dillon, who published his travels through Spain in 1780, adopted a large portion of it. In his preliminary discourse, Bowles avails himself of the opportunity to remark, that he was the first person who attempted to write a physical description of Spain; and it must be confessed that he endeavoured to render his labours useful by selecting practical subjects. Among these is a treatise on the management of Merino sheep, respecting which an interesting letter, the particulars of which were furnished by him, had previously appeared in the "Annual Register" for 1764, the first time the attention of the British public was called to this subject.

From the period of Bowles's visit, the works were conducted on a better principle; but, owing to original defects in the construction of the galleries, the mines, a few years afterwards, were inundated, which led to great difficulties and delays; in consequence of which, in 1784, the Spanish Government saw itself

obliged to enter into a contract with the Emperor of Germany for an annual supply of 6,000 quintals of quicksilver for Mexico, at the rate of 52 dollars per quintal, or 110 lbs. The article was shipped at Trieste, and conveyed to Cadiz, whence it was sent out to South America. The precarious nature of this supply, and the great sacrifice of capital, at length stimulated the exertions of the Spaniards, and, after an expensive and tedious process, rendered so by the defective nature of the machinery, the Almaden mines were drained. The works were then resumed, and placed under the direction of intelligent persons. So well, in fact, did the undertaking prosper, that in the course of a few years the importation of foreign quicksilver was dispensed with, and the Spaniards appeared on the list of exporters.

The hill on which the mines are situated is chiefly composed of sandstone, and on its summit rises a crest of naked rocks, streaked with cinnabar, indications which unquestionably led to the discovery of the mineral wealth concealed below. In other parts slate is seen, intersected with veins of iron, which on the surface follow the direction of the hill. The whole of the surrounding country abounds with ferruginous ore, and in the mines themselves portions of mineral are sometimes found, in which iron, quicksilver, and sulphur are blended together. The neighbouring elevations are composed of the same kinds of stone, present the same external appearances, and furnish the same plants.

The direction of the hill is from north-east to south-west, and its elevation about 125 feet. Two veins, from two to fourteen feet wide, and varying in richness, cross it in a vertical manner, which are called "La Mina del Pozo" and "La Mina del Castillo;" and miners have remarked, that the finer the sandstone, which serves as a matrix, the more abundant is the mineral. These veins meet near the most convex part of the hill, when they expand into a bed, equal to 100 feet wide, constituting the prodigious mass of ore known by the name of "El Rosario" (the Rosary), the discovery of which was at the time deemed so miraculous, that it was attributed to the special intervention of the Virgin, and of course dedicated to her. A belt of hard stone, from three to four feet wide, extends across the hill from north to south, intersecting the veins. Beyond this line the quicksilver does not pass.

The two veins above mentioned are the only ones worked at Almaden, and they have already been dug to such a depth that the drainage has become the heaviest item in the expense. Should steam be applied, this charge will, however, be materially reduced. Thrice, during the late contest, was Almaden taken by the Carlists. The last time they partly destroyed the machinery; but, if Spain ever settles down into a state of tran-

quillity, this undertaking will, in all probability, be conducted on a new plan. Hitherto the labouring department has been carried on by presidarios, or convicts, each of whom costs the government at the rate of eight rials, or two shillings, per day, whereas the peasants would perform the same drudgery for less, and, besides, do double the work. This appropriation of men condemned by the laws of their country is, in other respects, impolitic. It gives to a valuable mining district the character of a penal settlement, more abhorred than the dungeons of Ceuta, or the galley stations as they were conducted under the old *régime.*

The quantity of ground bored for shafts, and formed into caverns or resting-places for the miners, who descend in buckets or by means of ladders, has not been properly ascertained, but it is known to be immense. Scenes of the most terrific kind have sometimes occurred within these gloomy recesses, as may be easily imagined, from the nature of the toil and the class of persons by whom it is performed. Soon after the junction of the two veins in the manner previously noticed, owing to the confined state of the air, the gaseous exhalations caught fire, when numbers of the miners perished. The natives speak of this awful visitation in the most painful terms. The risk of another conflagration has since been obviated by means of additional shafts, which improve the ventilation and render the approaches easier.

Rich as are many portions of the Sierra Morena in vegetable and mineral productions, including lead and silver, there is no part of that extended range more curious and interesting, or better adapted for the study of natural history, than Almaden. The scenery is exquisitely picturesque, and occasionally majestic, although it does not embrace those stupendous precipices which mark the same mountain chain in the neighbourhood of Almuriadel and other elevated places, where the vulture nestles above and the wolf prowls below. In La Mancha the range of hills is comparatively low, but the *madronno*, or strawberry-tree, the *coscojo*, or dwarf oak, the *spino*, or thorn-tree, and other plants bearing a brown and shining foliage, the distinctive feature from which the appropriate appellation of the *Sierra Morena*, or Brown Ridge, is derived, are, nevertheless, seen in abundance. The earth, in fact, teems with natural curiosities only half explored. As before noticed, incidents of the most extraordinary kind have occurred here, and yet, even in the fanciful regions of Spain, Almaden was never famed in either poetry or romance. Not so the quicksilver mines of Idria. In them the Austrian Government has been in the habit of condemning its political enemies, sometimes men of family and rank, to toil; and it was an incident of this kind, in the person of a count, which furnished the idea of the dramatic poem called the "Mine."

Instances like the one recorded in that piece are not, however, met with at Almaden. Seldom does it happen that Spanish nobles, or persons of high condition, are so far debased as to be put on a level with plebeian felons, even when their crimes have been equally enormous. Justice in Spain does not wear so stern a front. The *forzados*, or convicts, sent to Almaden, are persons of the lower order, chiefly smugglers, bandits, or murderers, who would otherwise have been employed as galley-slaves, or, chained two and two, compelled to drag out a miserable existence in the dock-yards. The history of some of these offenders would afford ample scope for the pen of a novelist. Remarkable cases of heart-rending misery and oppression have also occurred in these abodes of wretchedness.

The system of compulsory labour is rendered more expensive to the government by the circumstance of its being necessary to have large establishments, besides a military force kept constantly on the spot. In spite of the vigilance displayed by the authorities, mutinies of the most desperate and bloody kind have occasionally broken out. It has, however, been ascertained, that the mercurial exhalations are not injurious either to man, beast, or plants. The native residents, who chiefly derive their livelihood from the mines over which their dwellings stand, enjoy good health, and sleep on a bed of cinnabar without the slightest apprehension. Bowles remarks, that in his time the working convicts, as a body, were a robust race, liable to no incidental diseases, and faring better than the common peasants. They are only compelled to work three hours in the day, besides having the advantage of the numerous holidays marked in the Spanish calendar; and yet, from mistaken notions of humanity, this kind of labour has been represented as a punishment worse than death. An assemblage of more depraved and obdurate characters, with some exceptions, cannot well be imagined. Many are old offenders—men who, in other countries, would have been sent to the gallows, but who possessed the small sum requisite to bribe their judges, or escaped condign punishment through the *empenno*, or intercession of some powerful advocate at court.

Instead of serving the purpose of a penitentiary, and affording to a frail or deluded youth the opportunity of reflecting on his situation and correcting his errors, this establishment becomes a school for the propagation of vice and debauchery. There is no chance for amendment. The convict prisons are, in fact, infinitely more dangerous to young men than the slave-barracks among the Algerines were in the time of Cervantes; nor can the mixture of ages and the confusion of crimes be contemplated without feelings of horror. In no country is the code of criminal laws more defective than in Spain; nowhere is the scale of punishment more imperfectly adjusted to the standard of equity

and expediency than in those tribunals which furnish workmen for the king's quicksilver mines.

The disparity of punishment is particularly glaring. A number of criminals, whose offences are of different enormity, are huddled together, and the same punishment awarded to them without the slightest distinction. Hence it is impossible that the effect contemplated by the legislature can be produced. Punishments should be proportioned to the guilt of the offence committed, for, when excessive and strictly inflicted, they render men desperate, and lead to more dangerous crimes than those which it was wished to prevent. This is the case with the Almaden convicts. When their period of servitude ends, these wretched beings are again let loose on society, infinitely more vicious and depraved than when they entered on their apprenticeship.

To describe the habits of these proscribed members of society, or to sketch the manner in which they employ the large amount of leisure time on their hands, would be an unpleasant task. The picture, besides, would be revolting to an English eye. Suffice it to say, that no moral precepts are instilled into their minds—no proper books circulate among them. Their overseers consider them in no other light than as labourers, valuable only according to the quantity of work that can be wrung from them in a given time, which, however, has been so limited as to prevent great abuses. Contamination is the misfortune of this system, and hence it often happens that the most desperate banditti infesting the roads are convicts who have returned from Almaden. Among them ingenious impostors may frequently be seen. Some feign to be afflicted with paralytic disorders, which they attribute to the nature of the work ; but in most instances their motive is to avoid the task assigned them, or to extort alms from the compassionate.

It is therefore to be hoped that the Spanish Government will be induced to abandon the unjust and inefficient mode of working their quicksilver mines by means of compulsory labour. It would be the interest of the mortgagees to see that this is done, more particularly as other workmen can easily be had. On the score of expense, the saving would also be considerable. In the district of Almaden there is ample scope for the regular pursuits of mining, without defeating the ends of justice. At Almadenejos, about two leagues distant from the town of Almaden, another quicksilver mine was discovered in the year 1755, but the works did not commence till 1780. In the province of Valencia, two quicksilver mines were discovered towards the middle of last century, but this article being a crown monopoly, no attempt was made to work either of them. The one is situated in the limestone mountains of Alcoray, a short distance from Alicant, and the other in the highlands between Valencia

and San Felipe. The city of Valencia is built on a bed of cinerous clay, about two feet in thickness, which traverses it from east to west, passing under the house of the Marquess de Dos Aguas, situated on the square of Villarosa, where, as an experiment, a shaft was sunk, and good samples of quicksilver brought up. For the reason above alleged, this experiment was carried no further; but, beyond all doubt, quicksilver may be had in the province of Valencia, although not so abundantly as at Almaden. It is situated on one of the declivities of a ridge of hills running between two rivulets, the one called Val de Asogues (Valley of Quicksilver), and the other Gargantiel, which, a quarter of a league further on, form a junction.

The spot on which the new mine stands was originally a secluded heath, forming part of an estate belonging to the military order of Calatrava, from whom it was taken and incorporated with the crown monopoly. Every encouragement was given to persons to settle upon this ground; a chapel and an hospital were erected, and soon afterwards smelting-furnaces constructed. Almadenejos, or, as it may more properly be called, Little Almaden, soon grew into a village of 1,300 inhabitants; and so important was the place considered, that it has since been encircled with walls, having one gate opening to the east and another to the west. The produce of the new mine, in some years, has equalled 12,000 quintals, but varies according to the number of hands employed. On an average it is 3,000 quintals.

The cinnabar, or mineralized mercury, presents itself under various forms, of which the striated is perhaps the most beautiful. Usually it is combined with sulphur, when the ore assumes a bright red, or vermilion colour. It also appears purely embodied in slate, mixed with calcarious spar, crystallized with sulphur, blended with quartz, and often an ironized mineral forms the matrix. Mercurial pyrites, of a yellow or sulphurous colour, are found, extraordinary in their size, and easily dissolved, which, when broken, exhibit particles of mercury. White quartz, richly ramified with cinnabar, is also met with; and occasionally crystallines are dug out, either lamellated, or in the form of rubies. Slate is seen streaked and dotted; and, lastly, pure quicksilver is collected among the breaks and in the crevices formed by the mouldering sandstone, even on the surface. The quantity of half-burnt scoria, left in heaps round the furnace sheds, is immense, of which, in any other place, a large portion might be worth passing a second time through the furnace.

If the mode of working these mines is injudicious, the process adopted for the preparation of the ore is equally so. The Spaniards, generally speaking, in their improvements, have not kept pace with other nations, and this is particularly visible in

their agricultural and mining enterprises. Prejudices have a stronger hold upon them than any other people in Europe. Retorts were used by the Germans for smelting the Almaden ore, as may be seen from the fragments scattered about on the hill; but, as before noticed, furnaces on the reverberatory principle were, after their time, introduced; and since that period scarcely have they undergone any change. In form, the one still used resembles a well-constructed limekiln, excepting that the chimney is placed in the front wall, in order that the flame may spread more equally over the surface. The mineral is heaped up in layers, and the top covered with clay, or a glutinous earth, in which are inserted a given number of aludels, or receivers, placed in an inclined position. A fire is then lighted with faggots, made of the aromatic shrubs with which the neighbouring heaths abound, and kept constantly fed. The blaze created by the resinous stems is intense; and when the mass with which the furnace is charged becomes heated to a proper degree, the volatile sulphur and mercury escape together and pass into the receivers, where the latter condenses and cools, and, being the heaviest, falls into vats ranged underneath to receive it.

Nitre and charcoal, pounded together, are sometimes mixed with the mass, in order to add to the intensity of the heat; but the loss of the metal is, nevertheless, great, as may be seen from the heaps of scoria, in which particles of mercury are found, blended with quartz, sulphuretted ochre, and ferruginous ore. The process is, besides, slow, as it takes nearly three days to smelt the contents of a furnace—usually about 2,000 lbs. of mineral, yielding, on an average, one-fourth of pure metal. Where the vein is particularly rich, there have been instances of one pound of ore yielding ten ounces. After the scoria has been removed, the furnace undergoes a thorough repair, the injury caused by the heat being always considerable. During the summer months the operation of smelting is suspended.

The quicksilver is collected in oblong troughs, built up with masonry, but the weight more than once has been so great as to burst the enclosure, when the metal was seen coursing down the hill in streamlets and globules. In this manner quantities have been lost beyond the power of redemption. Formerly, quicksilver, like wine, was packed in goat-skins; but this method, more particularly when intended for shipment, was found unsafe. At present it is put into thin cast-iron bottles, in shape resembling an imperial quart bottle, only larger, with half the neck cut off. To these bottles, each of which (filled) weighs about 75 lbs. net, there is no handle, which renders the deadweight extremely inconvenient. The mouth is secured with a screw, fitted in like the stopper of a decanter, excepting that the top tapers to a fine edge, so as to enter a hand-vice, by means of

which a purchase is obtained to force the screw when it is rusty, or has been wound round too tight. These bottles, called by the Spaniards *frascos*, are made in the Basque provinces, chiefly at the foundry of Iraeta, a beautiful estate belonging to the Duke de Granada, on the road from Azpeitia to Cestona. This establishment is situated on the river Urola, about half a league from the port of Zumaia, on the Guipuscoan coast, where the bottles are shipped for Seville. Here they are filled at the Almacen del Azogue (the government depôt), to which the quicksilver is brought down from the mines in skins, where it is emptied into wells, or troughs, and there kept till wanted for shipment.

It would be useless to burden the pages of this work with returns of the produce of the Almaden mines, such as they have been published for financial purposes by agents of the Spanish Government. It may suffice to say, that, since the Spaniards became exporters of quicksilver, and entered into competition with the Austrians, they have never allowed more to be taken from their mines than from 20,000 to 25,000 quintals per annum, although much more might have been obtained. In this restriction they acted from motives of policy, fearful that the market might be glutted, and the price, consequently, reduced.

The uses of quicksilver in England are too generally known to require any specific enumeration in this place.

The great consumption of the article is in the South American mines, and in that light it is that the subject has become so interesting to the British public; for, since the independence of the *quondam* colonies of Spain, the supplies are chiefly furnished (of course second-hand) from England, and our countrymen, besides, have a large stake in the mining enterprises of the New World.

Humboldt says that the quantity of mercury annually consumed in Mexico is equal to 2,000,000 lbs. weight, or 734 tons, and that all South America consumes about 25,000 cwt.,* or 1,250 tons, valued at 250,000*l.* sterling. The quantity and value may not be accurately stated. Since Humboldt's time both may have varied materially; but it is, nevertheless, a fact, that in this way the largest quantity of the mineral fluid is disposed of, and it has always been a maxim with the Spanish Government to keep the produce of the Almaden mines, as much as they could, under the demand for South America. The ministers in Madrid, no matter the party to which they belonged, were always inclined to act the part of monopolists, and in this respect circumstances have favoured them, more particularly of late years.

Competition has been limited, for the Idrian mines do not

* It is usually landed at Vera Cruz and Tampico, although small parcels are sometimes sent round Cape Horn to the western coast.

annually yield more than 150 to 170 tons of quicksilver—a portion of which is expended at home, and the rest chiefly finds its way to China. That used in the country is packed in bags made of sheep-skins, whereas the remainder intended for shipment is put up in cast-iron bottles, weighing 65 lbs. each when filled. The average price is 109 to 112 florins for 100 German lbs.; but even at this comparatively low rate, the quantity sent to South America is trifling. There, besides, it is not considered so good as that procured from Almaden; but, whatever may be the country from which the supplies originally come, as mercury is avowedly indispensable for the extraction of silver (at least, till some new process can be discovered), it follows that the quantity of the precious metals obtained does not depend so much on the richness of the ores as on the cheapness and abundance of the quicksilver with which the mines are supplied; and this position we believe cannot easily be controverted.

The precious metals, and more particularly silver, are seldom discovered in a metallic state, although occasionally it does happen that a small lump of pure silver is met with, called by the miners a *pepita* (kernel), of which a few beautiful specimens from the Pasco mines have been brought to England. Generally both silver and gold are in a very small proportion combined with other metals, such as arsenic, antimony, copper, &c., and at the same time mixed with various earthy substances. So small, indeed, is this proportion in the ore dug out of the Mexican mines, that it seldom exceeds five ounces in each quintal, or 100 lbs., and it has been remarked that, in Peru, the proportion is still less. In Germany, if from seventy to eighty ounces can be procured from a ton of ore, the miner is satisfied with his requital. The great difficulty therefore is, how to collect and detach from the surrounding mass of worthless matter the scattered particles, imperceptible as they are to the eye, of the valuable substance contained in any given quantity of rough ore.

Two modes of attaining this object have been discovered and practised; the one ancient, and the other comparatively modern—the one by a fire process, and the other by the combined operation of water; or, to speak technically, in the dry and wet way. The first process is by submitting the pulverized ore, mixed with the oxides of lead, to the action of heat, when the reduced or liquefied lead attracts to itself, and, as it were, subdues the particles of silver or gold dispersed in the mass with which the furnace is charged, and from which it is afterwards separated by a second process, called cupellation; that is, by refining the silver-lead and drawing off the litharge by means of a smelting-furnace, purposely constructed. This mode was adopted in the very earliest times; nay, with all their science, the Romans knew no other. In this respect they were not even

more advanced than the Indians of Peru, when discovered by the Spaniards.

The second process, which has in great measure superseded the first, is by amalgamation; that is, by mixing the wet powdered and sifted ore with salt, quicksilver, and other re-agents, when the mass being exposed to a fire heat, or to the action of the sun, the silver and gold enter into a chemical combination with the quicksilver, cohering and forming what is called an amalgam, or paste, from which the mercury is afterwards withdrawn by fusion.

The contracts with the Spanish Government for the exclusive sale of the Almaden quicksilver had for some time been held by Bordeaux houses; but, during the great fluctuations in the Madrid ministry, it was natural to expect that competitors would enter the lists. Accordingly, under the Toreno administration, and at a moment when the pressure on the Treasury was severely felt, notice was given that tenders for a new contract would be received, and the preference fell to the lot of Messrs. Rothschild.* Since that period the annual contract, with few exceptions, has been held by that eminent firm.

THE LEAD MINES AND MINERAL LAWS OF DERBYSHIRE.

The mines of Derbyshire, although yielding but an inconsiderable produce at the present period compared with earlier times, possess considerable interest from the extent to which they have been worked, the various proofs afforded of their ancient origin, and the peculiarity of the laws by which they are governed.

At Castleton is the Odin mine; which it is conjectured was so called after one of the Danish deities, while tradition states that this mine was worked by the Saxons about the close of the sixth century. The vein here, is that called a rake vein, running from east to west, and underlying, or *hading*, south. The operations, which were conducted horizontally, have been carried more than a mile in length from the entrance, and to a considerable extent both below and above the adit. The vein varies in thickness from four inches to eight feet; and the ore, which has yielded 60 per cent., is found in great quantities, with

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* Count de Toreno was appointed Finance Minister towards the close of 1834.

many fine crystallizations. The adit is driven in limestone, and after passing through shale, enters again into limestone.

In proof of the lead mines of Derbyshire having been wrought by the Romans, we have the authority of Dr. Millar, who states, "that in the year 1777 a pig of lead was found on Cromford Moor, and the interpretation of the inscription is 'The sixth legion inscribes this in memory of the Emperor Adrian.'" Several others have also been found at different periods; one about the year 1790, weighing twelve stone, was found at Matlock, bearing the following inscription—"TI. CL. TR. LUT. BR. EXARG.," which are supposed to be the abbreviations of "Tiberii Claudiani Triumviri Lutudari Britanniorum Exargentaria."

The Gregory mine, in Ashover, from the year 1756 to 1786 yielded 1,500 tons of lead, upon an average worth, at the then price of lead, upwards of 100,000*l.*, but in consequence of low prices and small demand, combined with the fact that the ore is found in less quantities (the veins becoming less), in proportion as the mine descends beyond 200 yards, it has been unwrought for seventeen years. This mine has been worked in the first limestone, first toadstone, and second limestone; the workings were in nearly the following measures; alluvial, 4 yards; blue bind, 16; shale, 200; first limestone and toadstone, 62; black bind (blackstone clay), 40; and in the second limestone, 32; the entire depth being 354 yards. The veins of lead ore are mostly found in the limestone, or basaltic strata called toadstone, but almost always strike a considerable way into the sub and super strata, whether shale (micaceous schistus), bind, or grit, so that the Gregory mine is said to find lead in grit, shale, and limestone. The vein-stuff, or matrix, is fluor-spar, crystals of calc, slickensides, indurated bitumen, blue John (of which the beautiful ornaments of Derbyshire spar are mostly made), &c. Elastic bitumen, or mineral caoutchouc, is not uncommon in the mines, and is found between the schistus and the limestone, as well as in small cavities; and it may be remarked, as a singular fact, that the fluor-spar which forms so great a portion of the matrix in lead veins in Derbyshire, has scarcely ever been found in the lead mines of Scotland. The veins of ore under and above the toadstone seldom run parallel, or in a line with each other, and never of the same thickness; but the deviation is but small, and something in a curved form, so that the points of the curves are frequently in a line parallel to each other.

The limestone strata contain a great number of mineral veins, which are of distinct kinds; the most common, as well as the most numerous, is the *rake* vein, which is a vertical crack, or fissure, filled with ore, spar, &c.; they usually keep a pretty straight course on the surface, running parallel to each other, and frequently have small pipe-veins crossing them at

right angles. The *pipe* vein is an horizontal cavity between the beds of limestone, filled with the usual matrix of barytes, fluor-spar, lime-spar, manganese, &c., usually accompanied by a narrow rake vein, or rake leading to or from it; sometimes, although but rarely, a *flat* rake is found—an horizontal cavity filled with ore and vein stuff, but which has no accompanying rake. When lead is found in detached masses, it is usually accompanied by quartz, clay, &c.; but spar seldom forms a component part.

The prevailing ores of this county are galena; sulphuret of lead, crystallized in cubes and hexagonal pyramids, frequently occurs, and slickensides, which is said to be a species of galena, is not uncommon, but which may, indeed, be nothing more than the fracture of leaf ore; it presents a smooth surface, which gives out a strong reflection, forming a thin plate, and usually adhering to cawk, or sulphate of barytes, which latter possesses the peculiar property of spontaneous explosion, when first laid bare, or exposed to atmospheric action. To avoid the danger attendant on working in its immediate contiguity, the miners use the precaution of merely making a small incision or aperture, with the point of the pick, and then retire to a place of safety, awaiting the result. In case of an explosion, it generally takes place in ten or fifteen minutes, and by the force attendant on which, considerable masses of ore, and even stuff, are detached.

The mining laws in force apply only to that part of the county known as the King's Field, or Hundreds of High Peak and Worksworth, extending to Crich, with a few modifications or exceptions; it has, however, been contended that the mining rights of the Crown are confined to such land manors as belonged to the Duke of Lancaster, and that these laws have no legal application to such estates as did not form part of that duchy. In the King's Field certain officers are appointed, called bar-masters, who hold mineral courts, at which a jury of twenty-four men decide all questions or disputes regarding the *cope*, or duties payable to the king or his men, or lessee, and who have also a power of determining all disputes or questions, and, in certain cases, of enforcing the payment of debts incurred in the working of mines.

These laws, which evidently originated in the very infancy of mining, are confined to the working of mines by manual labour only, and hence some of the customs necessary to be observed, may be considered as obsolete, or rather as a mere matter of form. Upon a person finding a vein of ore, the laws require him to make a cross on the ground, as a mark of possession, giving notice at the same time to the bar-master, who attends and receives a measure or dish of ore, being the first produce of the mine; this appears to be a preliminary condition for

allowing him to proceed in working his *meer* or measure of twenty-nine yards in length of vein, the bar-master at the same time taking possession of the next half-meer for the king (of fourteen and a half yards), which, after being valued by experienced persons, is invariably sold at 10*l.* to 100*l.* to the adjoining meer-holder. If the vein promise well, applications are made for the next meer, the same form being observed, and when there are a number of partners concerned in working the vein, they are termed *grove fellows.* The mining laws require not merely the discovery of a vein of ore (of which there are many which carry little or no lead), but one that has been worked so far as to produce the king's dish.*

The mode pursued in working the first mines was all open work, commencing at the loom-soil; mattocks, picks, hammers, and wedges were employed in loosening the ore and spar, the latter being thrown on each side their bowse, and having proceeded in this form as deep as was practicable, it became necessary to erect *stowses* or windlasses, or rope barrels, on each meer, by which means the refuse was drawn to the surface; and the great number of these open works formerly wrought, give, even at this day, a very unsightly appearance to some parts of the peak. A number of meers were thus worked at the same time in lines parallel to each other, strict laws being made and enforced by the Mineral Courts, to prevent the occupiers of the soil from levelling or meddling with these dangerous and unsightly apertures or ditches. As the mines, however, increased in depth, horse-gins were erected for drawing the ore and water, and the mines or *meers* became consolidated by the property of them being united, the meers being also connected below the ore and vein, were then carried to particular shafts to be drawn to the surface. Prior to this time, the Mining Laws required a working *stowse*, and its actual use, once in three weeks, in drawing ore on each *meer*, but in time became so far relaxed as to allow models of *stowses*, or sham drawing apparatus, which is provided by the bar-master, and is used to keep possession of the meers on a consolidated mine, and is even now so rigidly enforced, that a mine on which steam-engines and gins are erected, is not held to be legally occupied except one of those pigmy memorials of the ancient mode of drawing ore is constantly kept "in sight of all men." These laws punish by fines all men detected removing the bar-master's *stowses*, even if placed in the middle of a cultivated field, a common, or a fence wall. These models, to be

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* A dish of ore, Low Peak, is a rectangular box, twenty-eight inches long, six inches wide, and four inches deep, and will hold fourteen Winchester pints. High Peak, the dish is sixteen pints: every twenty-fifth dish belongs to the king. The tithe varies, but in most cases is one-fortieth, and there is also in the King's Field one-fortieth due to the lord of the manor, but which also is subject to some variations.

legal, must have no nails in their structure, as primitively made. The bar-master charges a small sum for these *shams*, and the miners are obliged to be particular in replacing them when broken or destroyed.

The principal minerals in the King's Field, to which these laws have reference, are lead, zinc, manganese, copper, iron ores (resembling the rich hematitic ores of Ulverstone), fluor, barytes, chert, china clay, and calcarious matters.

UPON THE MODE OF DETERMINING THE QUANTITY OF COPPER IN ORES AND SMELTING PRODUCTS BY THE HUMID WAY.

As practised at the Laboratory in the Royal Metallurgical Works at Freiberg.

The copper assay by the dry way belongs to those operations of assaying from which it is desired that the most true and accurate results may be given, but it proves imperfect in the examination of ores and smelting products, which yield only few per cent. of copper, and which, besides, consist of nickel, cobalt, iron, antimony, and other metals of this kind : therefore, if the question was to learn the real richness of copper in any ore or smelting product, I have always chosen the humid way and precipitated the copper from the solutions of substances under examination, by employing sulphuretted hydrogen. The sulphuret of copper, if only small quantities of it were obtained, was converted into an oxide by calcination, under the cover of a muffle ; if more, then it was digested with *aqua regia*, and the dissolved oxide of copper was precipitated on introducing caustic hydrate of potass into the heated liquid. But this process is rendered still more circumstantial, should the substance contain lead or silver (without the removal of which from the solution, the precipitation of pure copper cannot possibly take place), and loses much in accuracy and exactness, should, in addition to the already-named metals, antimony and arsenic be contained in the substances, whose richness in copper is to be determined, as, for instance, in *bleystein*, containing copper and other metals.

The process introduced in the laboratory of Mr. Sefstrom, and the Gustav silver smelting-house, at Fahlun, for determining the quantity of copper in copper ores, which, from the experimental assays since made, proves itself so admirably adapted for the

purpose, not only enables the assayer to find out the quantity of copper contained in ores of poor quality, but also in ascertaining the same, with the greatest ease and accuracy, in copper, scoria, &c. The process consists in general of the treatment of the substances containing copper, with concentrated sulphuric acid, and precipitating the solution obtained with metallic iron.

Although it may seem to require but little explanation, the success of an assay will be found to depend much on address, and a strict observance of the rules practice has laid down is strongly to be recommended. In order to obtain an average assay of the ore or product, any discretionary quantity is to be pounded in the mortar, the same as every other copper assay. A small portion of the powder is then again pounded in a mortar of steel or calcedony, and from three to five grammes * taken away and weighed; this powder is now brought into a bolt-head, the neck of which must be broken off, having a height of two and a half to three inches, and then mixed with three-fourths of an ounce of concentrated sulphuric acid. In order to avoid weighing the sulphuric acid, they make use of a pipette, with India rubber. Any number of such bolt-heads are placed in the sand-bath, which is filled an inch in depth with sand, and stands either in the open air or in a good draught. The fire under the sand-bath is to be gradually kept up till the sulphuric acid boils, and so till all steam from the sulphuric acid disappears, and the mass has become dry; six to twelve hours, according to the nature of the substances to be assayed, will be found necessary. In each bolt-head, one then pours twenty drops of sulphuric acid. After half an hour's digestion, the mass in the bolt-head can be poured over with hot boiling water, and then rinsed in a warmed precipitate glass. While the fluid is still hot, filter it likewise in a heated precipitate glass, and pour boiling water on the insoluble sediment till the whole solution amounts to two pounds. The precipitation of copper now takes place. An iron or steel plate is then used, from eight to nine inches long, filed square, and about a quarter of an inch thick; on this occasion, however, before employing the same, it must be wrapped up in paper and laid in the sand-bath to get hot. As soon as the hot copper solution is stirred with the bar, a strong ebullition of the hydrogen gas follows, and metallic copper will be precipitated. During the precipitation, one must cover the precipitate vessel with a plate of glass. If no more hydrogen gas is evolved, and the previous greenish-blue solution has become colourless, which generally takes place in one hour to one hour and a half, the precipitation which must take place in the sand-bath is completed. If the fluid has been properly thinned, and reddened the litmus-paper,

* The gramme is equal to 15·444 English grains.

and is hot, no copper generally will be found attached to the iron bar, it having detached itself and fallen to the bottom of the precipitate glass. The iron appears, as far as it has been immersed in water, to have covered itself with a thin coat of carbon. This is transferred with a camel-hair brush into the liquid, and after washing it in this manner, dry, and quickly polish it with a fine file. The liquid is now decantered from the precipitate glass in which the copper lies, as long as the same can be managed without loss, and the precipitate glass is again filled with hot water, till the copper, by this process, has become quite pure. Through repeated decantations all particles of carbon which have loosened themselves from the iron plate during the precipitation of the copper will be entirely separated from the last, and appear as a uniform powder, of a beautiful red copper-colour. After the last cleansing of the filter, the copper is brushed with a fine camel-hair brush, or the beard of a quill, into a prepared filter; dry the same at 100 degrees, and determine the weight of the metal. With small quantities of copper, instead of filtering, it is washed in a previously-weighed watch-glass, drawing off the small quantity of water by a pipette. The rest is then evaporated, and the metal weighed after drying it; the sooner this takes place the better, as the metal is easily affected by moisture of the air. A precaution necessary to be observed in the management of the operation above described, is the avoiding of all such circumstances as tend to produce or accelerate a higher degree of oxidation of the dissolved iron in the solution. It is therefore indispensably necessary, as I have many times convinced myself, in order to insure success to the experiment—

1. That hot water, as free from air as possible, be used to soften the said ore that has been treated with sulphuric acid.

2. That the solution of copper be highly diluted, and redden litmus-paper. The precipitation of copper is hastened by adding a few drops of sulphuric acid to the liquid.

3. That the precipitation be made while it is warm.

4. That the iron be well polished and heated before using.

5. That the precipitated copper be quickly removed from the liquid above it, and in washing the same hot water be used. A copper assay of the above description requires two days for performance; one can, however, very conveniently, during this time, prepare twenty-four; when one has several of the same to make at once, it is advisable, in filtration, to make use of a shelf similar to that used with the re-agent grasser, on which each individual hole for the reception of the funnel is numbered. It is also desirable, to avoid confusion, to number the glasses in which the copper is precipitated. Should it be wished to determine the richness of copper-slate in copper, through these means, which are well suited for the purpose, it is necessary to heat the

same red-hot, in order to drive off the bitumen. If it is supposed that the substance is not, perhaps, perfectly decomposed by the sulphuric acid, for safety's sake we might put some drops of *aqua regia* to the dried-up mass, before it is mixed with a second portion of sulphuric acid. This will happen, however, very seldom, for all those ores and smelting products tried, by this method, were always perfectly decomposed by the sulphuric acid, after they had been ground to powder, and a sufficient quantity of sulphuric acid applied ; also, when the washed residuum was treating in solution with *aqua regia*, the least signs of copper could never be detected, examining and treating the solution with ferro-cyanite of potassa, ammonia, and iron. If metallic sulphur, as, from the lead process (bleystein and bleispels), containing copper, are submitted to this assay, the component parts of lead and iron give in the state of sulphate a white or yellow residuum, so that the solution will scarcely contain anything else but sulphate of copper.

ON ACCIDENTS IN MINES.*

In our last volume we alluded to the fearful loss of life incurred in the different mines and collieries at that time ; we mentioned it had attracted the attention of the legislature, commissioners were appointed, and a mass of evidence has been produced, but as yet little practical good has been effected, and it would appear, while every other interest has its advocates, the working miner, of all the labouring classes, is the most neglected by the legislature, which ought to protect him. Notwithstanding the precautions which are said to have been taken to prevent the frightful recurrence of these awful calamities, we find that in the past year the number of accidents has been 406, being three more than in the preceding year. A singular coincidence will be observed on referring to the tables of 1848, that the number of deaths in that year were the same, viz. 567 ; the injuries were, however, considerably greater, being increased by 102. On comparing the tables, it will be found that accidents resulting from machinery are much less than is generally imagined, those from

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* The following are abbreviations of the terms employed in the several tables accompanying the present paper :—Exp. Explosion of Fire Damp or Carbonic Gas.—F. R. Fall of Rock or Coal.—Co. Colliery.—F.S. Fall in Shaft or Pit.—I.W. Iron Works.—A.S. Accident in Shaft or Pit.—Ma. Machinery.—M. Mine.—Ac. Accident.—Qu. Quarry.

explosions and fall of rock comprising the majority. Having previously dilated on the importance of some steps being taken by those interested to ameliorate the condition of the working miner, any lengthened remarks would be but a recapitulation of our so often expressed opinions on this subject, whether in the *Mining Journal* or through the present medium; we have therefore only to submit to our readers the statistical information which has been compiled, giving the returns for the years 1848 and 1849.

1848.	Deaths.						Injuries.					
	Ex.	F.R	F.S.	Ma.	Ac.	Total.	Ex.	F.R	F.S.	Ma.	Ac.	Total.
January	12	18	16	7	..	53	14	3	3	1	8	29
February	36	21	15	17	..	89	18	3	2	4	..	27
March..	16	17	7	5	..	45	3	6	2	2	2	15
April	51	15	12	3	2	83	17	6	2	..	1	26
May	5	11	2	4	1	23	6	2	..	..	..	8
June	22	11	2	2	2	39	6	..	..	5	1	12
July	..	5	4	4	3	16	10	4	1	..	2	17
August	47	13	1	2	6	69	12	4	..	1	..	17
September	12	9	4	7	..	32	6	3	2	..	..	11
October	10	8	3	4	3	28	11	2	..	3	..	16
November	34	15	4	..	3	56	1	5	1	2	..	9
December	11	20	..	..	3	34	26	17	..	..	9	52
Total ..	256	163	70	55	23	567	130	55	13	18	23	239

1849.	Deaths.						Injuries.					
	Ex.	F.R	F.S.	Ma.	Ac.	Total.	Ex.	F.R	F.S.	Ma.	Ac.	Total.
January	84	10	6	..	7	107	..	4	4	..	4	12
February	4	4	5	..	..	13	5	..	3	..	..	8
March..	24	13	6	1	1	45	15	7	10	..	1	33
April	11	17	5	1	..	32	20	11	..	5	1	36
May	6	18	9	5	4	44	11	7	13	..	1	29
June	69	16	10	1	6	102	74	7	1	1	1	87
July	18	11	14	..	5	48	17	1	..	..	3	21
August	17	9	4	2	2	34	3	1	4	..	..	8
September	10	11	12	..	5	38	17	6	..	1	1	25
October	3	11	2	5	4	25	8	7	3	7	3	28
November	3	13	5	1	14	36	9	..	..	9	1	19
December	6	21	12	..	4	43	31	1	1	..	2	35
Total ..	255	154	90	16	52	567	210	52	39	23	17	341

In addition to these we give the monthly returns for the last three years, from which it will be seen that during that period, from various causes, no less than 1,757 deaths have occurred, while the injuries have amounted to 776.

	1847.				1848.				1849.			
	Accid.	Dths.	Injurs.	Total.	Accid.	Dths.	Injurs.	Total.	Accid.	Dths.	Injurs.	Total.
January	44	92	15	107	43	53	29	82	28	107	12	119
February	34	56	15	71	44	89	27	116	14	13	8	21
March ..	49	31	12	43	32	45	15	60	36	45	33	78
April ..	22	48	15	63	40	83	26	109	36	32	36	68
May ..	40	40	8	48	23	23	8	31	40	44	29	73
June ..	50	44	13	57	39	39	12	51	47	102	87	109
July ..	37	80	15	95	21	16	17	33	37	48	21	69
August..	38	46	25	71	32	69	17	86	28	34	8	42
Septemb.	51	26	19	45	31	32	11	43	32	38	25	63
October	60	60	40	100	26	28	16	44	33	25	28	53
Novemb.	39	57	5	62	31	56	9	65	35	36	19	55
Decemb.	24	42	14	56	41	34	52	86	40	43	35	78
Total..	488	623	196	819	403	567	239	806	406	567	341	908

Although these probably furnish all the statistical information which may be required, we prefix the causes which have led to this awful waste of human life.

Date.		Number of Accidents.	Deaths.						Injuries.						Totals.	
1849.			Exp.	F.R.	F.S.	Ma.	Acc. not specified	Total.	Exp.	F.R.	F.S.	Ma.	Acc. not specified	Total.	D.& Inj. Weekly.	Monthly amount.
January	6	9	..	1	3	..	4	8	..	2	3	..	1	6	14	
	13	2	..	1	1	..	..	2	..	1	..	..	..	1	3	
	20	8	..	5	1	..	2	8	..	1	..	..	1	2	10	
	27	9	84	3	1	..	1	89	..	..	1	..	2	3	92	119
February	3	2	..	1	1	..	..	2	..	..	..	..	..	..	2	
	10	2	..	..	..	..	..	..	..	..	3	..	..	3	3	
	17	4	1	1	2	..	..	4	..	..	..	..	..	..	4	
	24	6	3	2	2	..	..	7	5	..	..	..	..	5	12	21
March	3	6	9	3	..	..	..	12	9	..	..	..	..	9	21	
	10	3	13	..	..	..	..	13	2	1	..	..	..	3	16	
	17	12	..	3	3	..	..	6	4	5	2	..	1	12	18	
	24	7	1	2	1	1	..	5	..	1	1	..	..	2	7	
	31	8	1	5	2	..	1	9	..	..	7	..	..	7	16	78
April	7	14	5	6	1	..	..	12	9	6	..	..	..	15	27	
	14	6	1	4	2	..	..	7	7	..	..	..	..	7	14	
	21	4	3	2	..	..	..	5	2	2	..	4	..	8	13	
	28	12	2	5	..	1	..	8	2	3	..	1	..	6	14	68
May	5	12	3	6	2	1	..	12	8	..	..	..	..	8	20	
	12	11	..	3	..	3	3	9	2	1	1	..	1	5	14	
	19	10	..	6	..	1	1	8	..	3	..	..	..	3	11	
	26	7	3	3	9	..	..	15	1	..	12	..	..	13	28	73
June	2	9	..	1	..	..	1	2	4	3	1	1	..	9	11	
	9	11	32	4	5	..	2	43	1	3	..	..	1	5	48	
	16	8	..	2	2	1	1	6	3	..	..	..	..	3	9	
	23	5	2	2	..	..	1	5	4	1	..	..	..	5	10	
	30	14	35	7	3	..	1	46	62	3	..	..	..	65	111	189
July	7	10	3	2	..	..	1	6	15	1	..	..	1	17	23	
	14	12	1	7	2	..	3	13	..	..	..	..	1	1	14	
	21	6	11	—	1	..	..	12	2	..	..	..	1	3	15	
	28	9	3	2	11	..	1	17	..	..	..	..	..	..	17	69

Date. 1849.	Number of Accidents.	Deaths. Exp.	Deaths. F.R.	Deaths. F.S.	Deaths. Ma.	Deaths. Acc. not specified	Deaths. Total.	Injuries. Exp.	Injuries. F.R.	Injuries. F.S.	Injuries. Ma.	Injuries. Acc. not specified	Injuries. Total.	Totals. D.& Inj. Weekly.	Totals. Monthly amount.
August 4	10	1	3	2	2	1	9	2	..	..	..	..	2	11	
11	5	7	1	1	..	..	9	..	..	..	..	..	..	9	
18	7	1	3	1	..	..	5	1	1	1	..	..	3	8	
25	6	8	2	..	..	1	11	..	..	3	..	..	3	14	42
September 1	6	1	3	1	..	..	5	..	2	..	..	1	3	8	
8	3	..	1	..	..	..	1	6	..	..	1	..	7	8	
15	13	5	5	5	..	2	17	10	1	..	..	..	11	28	
22	3	..	1	..	..	1	2	..	2	..	..	..	2	4	
29	7	4	1	6	..	2	13	1	1	..	..	..	2	15	63
October 6	2	..	..	..	3	..	3	2	..	..	2	..	4	7	
13	10	2	3	..	1	..	6	2	3	1	3	1	10	16	
20	12	..	4	2	1	3	10	2	2	2	..	2	8	18	
27	9	1	4	..	..	1	6	2	2	..	2	..	6	12	53
November 3	5	..	2	..	..	3	5	..	..	..	4	1	5	10	
10	9	1	3	..	..	5	9	..	..	..	1	..	1	10	
17	13	1	4	4	1	3	13	5	..	..	4	..	9	22	
24	8	1	4	1	..	3	9	4	..	..	..	..	4	13	55
December 1	4	1	4	1	..	..	6	24	..	..	..	..	24	30	
8	7	..	3	1	..	..	4	3	1	..	..	1	5	9	
15	14	5	7	3	..	3	18	4	..	1	..	..	5	23	
22	8	..	4	3	..	..	7	..	..	..	..	1	1	8	
29	7	..	3	4	..	1	8	..	..	..	..	..	..	8	78
Total..	406	255	154	90	16	52	567	210	52	39	23	17	341	908	908

The following table gives the various localities and causes of accident:—

Date.	Name of Mine.	Killed.	Injured.	Cause.	Date.	Name of Mine.	Killed.	Injured.	Cause.
1849.					1849.				
Jan. 6	Heaton Colliery ..	1	..	Ac.		Baynalls Colliery ..	..	1	Ac.
	East Cramlington Co.	1	..	F.R.		Burnslance Co. ..	1	..	F.R.
	Brierly Hill Co. ..	..	2	F.R.		Aberavon	1	..	Exp.
	Hafod Copper Works	1	..	Ac.		Lofthouse	1	..	F.R.
	Rowley Regis ..	..	2	F.S.		Whitehaven	1	..	Ac.
	Bumble Hole Co. ..	..	1	Ac.	Feb. 3	Whiteriggs Pit ..	1	..	F.R.
	Danly Bank Co. ..	1	..	F.S.		West Bromwich ..	1	..	F.S.
	Old Washington Co.	2	1	F.S.	10	North Roskear ..	..	1	F.S.
	West Bromwich ..	2	..	Ac.		Mandubeagh Co. ..	..	2	F.S.
13	Willingsworth ..	1	..	F.S.	17	Kingswinford ..	1	..	F.R.
	Sedgely	1	1	F.R.		Rowley Regis ..	1	..	F.S.
20	Levant	1	..	F.S.		Aberavon	1	..	F.R.
	Butterly Co... ..	1	..	F.R.		Stray Park	1	..	Exp.
	Plymouth Works ..	..	1	Ac.	24	Pontypoid Co. ..	1	..	F.S.
	Dowlais	2	..	Ac.		Clay Cross	1	..	F.S.
	Plymouth Works ..	1	..	F.R.		Burnslance Co. ..	1	..	F.R.
	Cwmbargoed Pit ..	1	..	F.R.		Merthyr	1	..	F.R.
	Garth Colliery ..	1	1	F.R.		Rowley Regis ..	3	..	Exp.
	Wolverhampton ..	1	..	F.R.		Victoria Pits.. ..	..	5	Exp.
27	Darley Main Co. ..	83	..	Exp.	Mar. 3	Bird in Hand Co. ..	7	2	Exp.
	MonkWearmouth Co.	1	1	F.S.		Capon Field	1	..	F.R.
	Whitton Park IronW.	..	1	Ac.		Denbigh Hall ..	1	..	F.R.
	Govie Colliery ..	1	..	F.R.		Merthyr	1	..	F.R.

Date.	Name of Mine.	Killed.	Injured.	Cause.
1849.				
	Bradford	1	7	Exp.
	Alleston Bywater Co.	1	..	Exp.
Mar10	Middle Patricroft Co.	12	2	Exp.
	Haydon Hill Co. ..	1	..	Exp.
	Ditto	..	1	F.R.
17	Badeley End Co. ..	2	2	F.S.
	Woodthorpe Co. ..	1	..	F.R.
	Tonmaur Colliery ..	..	1	Exp.
	Bearmoor Colliery ..	..	2	F.R.
	Lion Colliery ..	..	1	F.R.
	Consall Colliery ..	..	1	Exp.
	Wolverhampton ..	..	1	Exp.
	Chillington Works ..	..	1	Ac.
	Strangeway's Co. ..	..	1	Exp.
	Meifield Co... ..	1	..	F.R.
	Whitwood Co. ..	1	..	F.S.
	Clydach Iron Works	1	2	F.R.
24	Cleator Iron Works..	1	..	Ma.
	Cyfartha	1	..	F.R.
	Dowlais	1	..	Exp.
	Spital Tongues ..	1	..	F.R.
	Ronyhills	..	1	F.R.
	Clatteroal Co. ..	..	1	F.S.
	Heath Co.	1	..	F.S.
31	Dowlais	1	..	F.R.
	Hebburn Co... ..	2	..	F.S.
	Cleveland	1	..	F.R.
	Conygreaves Co. ..	2	..	F.R.
	Kingshull	1	..	F.R.
	Ulverston	1	..	Ac.
	Kettley Iron Works..	..	7	F.S.
	Mosbro	1	..	Exp.
April 7	North Roskear ..	..	2	Exp.
	Bilston	1	..	F.S.
	Tredegar	1	..	F.R.
	Penpale Works ..	3	3	Exp.
	Risca	1	..	Exp.
	Darlaston	1	..	F.R.
	Cut Hedge	..	2	F.R.
	Holly Hole Mine ..	1	1	F.R.
	Hindley Green ..	1	3	Exp.
	Higginthnon Co. ..	1	..	F.R.
	Congreaves Co. ..	..	1	F.R.
	Badyers Co... ..	..	1	Exp.
	Codsall Pit	1	2	F.R.
	Titford Co.	1	..	F.R.
14	Great Polgooth ..	1	..	F.S.
	Pontypool	1	..	F.R.
	Aberyschan	1	7	Exp.
	Bilston	1	..	F.S.
	Rowley Regis ..	1	..	F.R.
	Landshipping Co. ..	2	..	F.R.
21	Blaenarvon	1	2	F.R.
	Kingswinford ..	3	2	Exp.
	Bilston	1	..	F.R.
	Carn Brea	..	4	Ma.
28	Bearn Mine	1	..	Ma.
	West Bromwich ..	..	1	Ma.
	High Pittington ..	1	..	F.R.
	Hayden Hill Co. ..	1	..	F.R.
	Buck House Co. ..	..	1	F.R.

Date.	Name of Mine.	Killed.	Injured.	Cause.
1849.				
	Codsall Co.	..	1	F.R.
	Willen Hall	1	..	F.R.
	Wolverhampton ..	..	1	F.R.
	Mostyn Co.	1	2	Exp.
	Cwmavon	1	..	F.R.
	Dowlais	1	..	Exp.
	Aberywarr	1	..	F.R.
May 5	Pondlebury Colliery	1	6	Exp.
	Fishpond's Colliery..	1	2	Exp.
	Kingswinford ..	1	..	F.S.
	Ditto	1	..	Exp.
	Sandhill Colliery ..	1	..	F.R.
	Bilston	1	..	F.R.
	Lestersfield	1	..	F.S.
	Pennydaren	1	..	F.R.
	Butterworth	1	..	F.R.
	Cwmlranc	2	..	F.R.
	Still House Colliery..	1	..	Ma.
12	South Roskear ..	..	1	F.S.
	Dudley	..	1	Ac.
	West Bromwich ..	2	..	Ac.
	Bilston	1	..	Ma.
	Tipton	1	..	Ma.
	Oldbury	1	1	F.R.
	Maerty	1	..	F.R.
	Wigan	..	2	Exp.
	Little Lumley ..	1	..	Ac.
	Risca	1	..	F.R.
	Cwm Daws	1	..	Ma.
19	Merthyr	1	..	F.R.
	Plymouth Level ..	1	..	F.R.
	Dowlais	1	..	F.R.
	Pen-y-daren	1	..	Ma.
	Gerdered Road ..	1	..	F.R.
	Lynvi I. C.	..	2	F.R.
	Millfield	1	..	Ac.
	Bell Farm Colliery ..	..	1	F.R.
	Woodshuts Colliery..	1	..	F.R.
	Broomside Colliery ..	1	..	F.R.
26	Werfa Colliery ..	2	..	Exp.
	Free Forest Colliery	9	10	F.S.
	Tipton	1	1	Exp.
	Kingswinford ..	1	..	F.R.
	Dudley	1	..	F.R.
	Botallack Mine ..	..	2	F.S.
	Boswiddin	1	..	F.R.
June 2	Kingswinford ..	..	1	F.R.
	Stratford-on-Avon ..	..	1	F.S.
	Caponfield	..	1	Ma.
	Bilston	..	3	Exp.
	Bell Farm Colliery ..	..	1	F.R.
	Dudley Port	..	1	Exp.
	New Lion Colliery ..	..	1	F.R.
	Merthyr	1	..	F.R.
	Rochdale	1	..	Ma.
9	Hebburn Colliery ..	32	1	Exp.
	West Bromwich ..	1	3	F.R.
	Kinggoodie Quarry..	1	..	F.S.
	Farnworth	1	..	F.S.
	Bilston	3	..	F.S.
	Dudley Port	1	..	Ac.

Date.	Name of Mine.	Killed.	Injured.	Cause.
1849.				
	Dowlais	1	..	F.R.
	Little Leva	1	..	F.R.
	Wheal Rore	1	..	F.R.
	Witton Park Colliery	1	..	Ac.
	Brierly Hill	..	1	Ac.
Jun. 16	N. Elswick Colliery	..	2	Exp.
	New Lion Colliery	1	..	F.R.
	Shuttend	..	1	Exp.
	Wolverhampton	1	..	F.R.
	East Wheal Rore	1	..	F.S.
	Delabole Slate Quarry	1	..	Ac.
	Bishopswearmouth	1	..	Ma.
	Gwennapp	1	..	F.S.
23	Merthyr	1	..	Ac.
	Cyfartha	1	..	F.R.
	Little Unsworth	1	..	F.R.
	Gosforth	2	4	Exp.
	Dudley	..	1	F.R.
30	Laffack Colliery	8	19	Exp.
	Morris Colliery	25	43	Exp.
	West Bromwich	1	..	Exp.
	Buxton	1	1	F.R.
	Ayrshire Iron Comp.	3	1	F.R.
	Amble	1	..	F.R.
	Llaniallach	1	..	F.S.
	Merthyr	1	..	Ac.
	Cyfartha	1	..	Exp.
	Tividale	..	1	F.R.
	Dunstone	1	..	F.S.
	Summercoat	1	..	F.R.
	Derbyshire	1	..	F.S.
	Sedgely	1	..	F.R.
July 7	Tarbach	1	3	Exp.
	Ystalfera	..	2	Exp.
	Morfa Colliery	2	2	Exp.
	Tividale	..	1	Ac.
	Brierly Hill	..	4	Exp.
	Rowley Regis	..	4	Exp.
	Lanchester	1	..	Ac.
	Wheal Lewis	..	1	F.S.
	Wheal Margaret	1	..	F.R.
	Meadows Colliery	1	..	F.R.
14	Gateshead	1	..	Exp.
	Tipton	1	..	F.S.
	Brierly Hill	1	..	F.R.
	Bilston	1	1	Ac.
	Dowlais	1	..	F.R.
	Amble	1	..	F.R.
	Gosforth	2	..	Ac.
	Spring House Co.	1	..	F.R.
	Kingswinford	1	..	F.R.
	Trentham Colliery	1	..	F.R.
	Oldham	1	..	F.R.
21	Newton	..	1	Exp.
	Scots Green	..	1	Ac.
	Whitehaven Colliery	1	..	F.S.
	Minerva Colliery	9	1	Exp.
	Clay Cross	1	..	Exp.
	Worsdley	1	..	Exp.
28	Flint	8	..	F.S.
	Wordsley	1	..	Exp.
1849.				
	Bilston	1	..	F.S.
	Wolverhampton	1	..	Ac.
	Pennydaren	1	..	F.S.
	Merthyr	1	..	F.R.
	Thorpehall	2	..	Exp.
	Thornley Pit	1	..	F.S.
	Trimdom Colliery	1	..	F.R.
Aug. 4	Aberamon	..	2	Exp.
	Dowlais	1	..	F.R.
	Hadenshill Colliery	1	..	F.R.
	Greenhead Colliery	1	..	Ma.
	Horton Colliery	1	..	Ac.
	Threapthwaite Co.	1	..	Exp.
	Codnor Park	1	..	F.R.
	Brierly Hill	1	..	F.S.
	Bilston	1	..	F.S.
	Darlaston	1	..	Ma.
11	Droyleston	1	..	Exp.
	Stow Heath Colliery	1	..	F.S.
	East Wood Colliery	1	..	Exp.
	Evers Colliery	1	..	F.R.
	Pontypool	5	..	Exp.
18	Tividale	..	1	F.S.
	Crowan	1	..	F.R.
	Bilston	1	..	F.S.
	Wolverhampton	1	..	F.R.
	Wednesfield Heath	1	1	Exp.
	Dixon's Green	..	1	F.R.
	Camborne	1	..	F.R.
25	Haswell Pits	1	..	Ac.
	Wishaw Colliery	8	..	Exp.
	Carmoyle	..	2	F.S.
	Tipton	1	..	F.R.
	Oldbury	..	1	F.S.
	Thowset	1	..	F.R.
Sept. 1	Great Polgooth	1	..	F.S.
	Sedgeley	1	..	F.R.
	Kingswinford	1	1	F.R.
	Gainsborough	1	..	Exp.
	Twydale	1	1	F.R.
	Bates' Pits	..	1	Ac.
8	Llandaven Colliery	1	6	Exp.
	South Roskear	..	1	Ma.
	Pontypool	1	..	F.R.
15	Tipton	4	..	Exp.
	Brierly Hill	1	..	F.S.
	Dudley	1	..	F.R.
	Badgers Colliery	..	2	Exp.
	New Lion Colliery	..	1	Exp.
	Eagle Colliery	..	1	F.R.
	Sedgely	1	..	F.R.
	Tonge Moor	2	..	F.S.
	Newbiggen Iron Wks.	1	7	Exp.
	Pennydaren	2	..	F.R.
	Radcliffe Colliery	1	..	F.R.
	Pennymarin Colliery	2	..	F.S.
	Derwent	2	..	Ac.
22	Balswidden	1	..	Ac.
	Great Polgooth	..	2	F.R.
	South Wingate Co.	1	..	F.R.
29	Cumnock	2	..	Exp.

Date.	Name of Mine.	Killed.	Injured.	Cause.
1849.				
	Shuttend Colliery ..	2	1	Exp.
	Bilston	5	1	F.S.
	Bunker's Hill ..	1	..	F.R.
	Llanidloes	1	..	Ac.
	Wednesbury ..	1	..	Ac.
	Wolstanton	1	..	F.S.
Oct. 6	Burnley	3	2	Ma.
	Wigan	..	2	Exp.
13	Wolverhampton ..	1	..	Ma.
	Bilston	..	3	F.R.
	Sparrow's Colliery ..	1	..	F.R.
	Birmingham	1	..	Exp.
	Tividale	..	1	F.S.
	Cradley	1	2	Exp.
	Shipley	1	..	F.R.
	Ystalyfera	..	1	Ac.
	Walker Iron Works	..	3	Ma.
20	St. Austell	3	1	Ac.
	Camborne Vean ..	..	1	Exp.
	Pontypool	1	..	F.R.
	Vartey Iron Works ..	1	..	F.R.
	Wakefield	1	..	F.S.
	West Bromwich ..	1	2	F.S.
	Masboro Commons ..	..	1	F.R.
	Castle Mill Quarry ..	..	1	Exp.
	Brierly Hill	1	1	F.R.
	N. B. I. C. Works ..	1	..	Ma.
	Ashton	1	..	F.R.
	Tipton	..	1	Ac.
27	Delabole Quarry ..	1	..	F.R.
	Par Consols	1	..	F.R.
	Castle Mill Quarry ..	1	..	F.R.
	Bitchburn	1	..	Ac.
	Daralston	1	..	F.R.
	Aberdeen	..	1	F.R.
	Shrubbery Iron Wks.	..	2	Ma.
	Haydon's Colliery ..	..	1	F.R.
	Weigfach Colliery ..	1	2	Exp.
Nov. 3	Cuddra Mine	3	..	Ac.
	New Quay Consols ..	..	1	Ac.
	Llanrjog	..	3	Ma.
	Chapple Hill Colliery	..	1	Ma.
	Bilston	2	..	F.R.
10	Wheal Leta	1	..	Ac.
	Garras	1	..	F.R.
	Dalmellington ..	2	..	Ac.
	Merthyr	1	..	Ac.
	Dyffryn	1	..	Ac.
	Dingdong Mine ..	..	1	Ma.
	Dudley	1	..	F.R.
	Parkfield Colliery ..	1	..	F.R.
	Aberavon	1	..	Exp.
17	Bucketsfield Colliery	1	..	F.R.
	Meadows Pit	1	..	F.R.
	S. Helton Colliery ..	1	..	Ac.
	Bennet's Colliery ..	1	..	F.R.
1849.				
	Hill Top Colliery ..	1	..	F.S.
	Ashton-under-Lyne	1	..	F.S.
	Wheal Seton	1	..	Ac.
	Myny-ddnewy-dd ..	1	..	F.S.
	Giet's Green	1	4	Ma.
	Rowley Regis ..	1	5	Exp.
	Pontypool	1	..	Ac.
	Hetherly Pit	1	..	F.S.
	Black Purse Colliery	1	..	F.R.
Nov 24	Clay Cross	1	1	Exp.
	Shipley	1	..	Ac.
	Ystalyfera	..	1	Exp.
	Brynder Colliery ..	1	..	Ac.
	Bilston	1	..	Ac.
	Bryndewy Colliery ..	..	2	Exp.
	Woodride Colliery ..	4	..	F.R.
	Walsall	1	..	F.S.
Dec. 1	Dawley	1	4	Exp.
	Neltherton Colliery ..	1	..	F.S.
	Woodside Colliery ..	4	..	F.R.
	Eskyr Co., Neath ..	..	20	Exp.
8	Wednesbury	1	..	F.R.
	Blackburn	1	..	F.R.
	Cosely	..	1	F.R.
	Dudley	1	..	F.R.
	Wigan	..	1	Ac.
	Woodhouses	1	..	F.S.
	Ditto	..	3	Exp.
15	Rotheram	..	1	F.S.
	Brynbo Colliery ..	2	1	Exp.
	North Wood	2	..	Exp.
	Merthyr	2	..	F.R.
	Ditto	2	..	Ac.
	Heatherly	1	..	Ac.
	Sheffield	1	..	F.R.
	Dean Colliery ..	1	..	Exp.
	Cradley Heath ..	1	..	F.R.
	Oak Farm Colliery ..	1	..	F.R.
	Shuttend	1	..	F.R.
	Cystanog	1	..	F.R.
	Llanelly	..	3	Exp.
	Wednesbury	3	..	F.S.
22	Bolton	1	..	F.R.
	Dudley	1	..	F.R.
	Rotheram	..	1	Ac.
	Wolverhampton ..	1	..	F.S.
	Agecroft	1	..	F.R.
	Codnor Park	1	..	F.S.
	Lewis Mines	1	..	F.S.
	Rhymney	1	..	F.R.
29	Durham	1	..	F.S.
	Horton	1	..	F.S.
	Murton Colliery ..	1	..	Ac.
	Pelsall	1	..	F.R.
	Bilston	1	..	F.S.
	Lewis Mines	1	..	F.S.

We propose to give these returns annually, and we shall feel

gratified if our strenuous endeavours to draw attention to this crying evil may excite such notice that the ills so justly complained of may be effectually and speedily remedied.

*** The sad loss of life incurred in the present year, since the compilation of these tables, adduces strong evidence in favour of the justice of our remarks.

AN INTRODUCTION TO MINERALOGY.

There are many and great difficulties which arise when contemplating a new scientific classification of substances, as there are so many characteristics which must be taken into consideration in order to arrive at some certain order; and at the same time all cannot be made use of in naming them, without bringing the whole into very great confusion. If we take a view of the system of mineralogy already adopted, we find that they have been classified differently, but without actual change of name, though in some instances one name is substituted for another. The present mineralogical nomenclature is of mixed origin; some deriving their appellations from scientific persons, who first recognized them as separate substances; some from the place where they first discovered; some are of Greek or Latin origin; and the remainder are named according to their chemical nature, as carbonate of lime, &c. &c. Thus we see a diversity of nomenclature entering into one mineralogical arrangement, the names for the most part conveying no idea of the substance to which they relate, but either derived from Latin or Greek, or from the original place where a mineral was first found (but now to be found in numerous other places), or from a noted mineralogist, serving not to denote the mineral, but to hand his name down from one generation to another; and some are upon firmer grounds, as those founded upon chemistry. This last is the most perfect principle, and conveys an idea of a mineral, in itself very distinct, and certainly of great use. Though it would be almost impossible to name every mineral, on account of the number which bear a chemical affinity to each other, they are reduced under a certain number of heads, to which are added the class of minerals which they comprehend. There are only three classes; viz.—I. Earthy minerals, divided into nine sub-species, from the

nine different elementary earths, which are among the chemical elements. However these have been reduced to metallic bases. II. Native metals. III. Inflammable materials.

CLASS I.

EARTHY MINERALS.

	New System.	Old System.
1. ZIRCONITE	.. ..	.. Zircon.
Do.	.. Ferro-zirconite	.. Hyacinth.
2. GLUCINITE	.. ..	.. Emerald, euclase.
Do.	.. Alumino-glucinite	.. Beryl.
3. SILICITE	.. .. ..	.. Quartz.
Do.	.. Hydro-silicite	.. Cat's-eye, opal, flint, menilite.
Do.	.. Alumino-silicite	.. Chalcedony, cornelian, onyx, agate, jasper, hornstone.
Do.	.. Calc-silicite	.. Zeolite, chabasite, stilbite, silicious sinter.
Do.	.. Ferro-silicite	.. Lievrite, garnet, cinnamon-stone.
Do.	.. Calcalumino-silicite	.. Idocrase, prehnite, heulandite, scolezite, Wernerite zoisite, epidote
Do.	.. Ferro-calc-silicite	.. Axinite, Indianite, lapis lazuli.
Do.	.. Ferro-alumino-silicite	.. Tourmaline.
Do.	.. Hydr. alumino-silicite	.. Slate, clay, fahlunite.
Do.	.. Baryti-silicite	.. Harmatome.
Do.	.. Magnesi-calc-silicite	.. Augite, sahlite, fassaite, euchysiderite, hornblende, pargasite, hedenbergite.
Do.	.. Magnesi-silicite	.. Tremolite, schiller spar, asbestos, kyanite, staurolite.
Do.	.. Potassi-silicite	.. Jade, obsidian, gabronite, petalite.
4. MAGNESITE	.. ..	.. Magnesia.
Do.	.. Hydro-magnesite	.. Hydrate of magnesia.
Do.	.. Alumino-magnesite	.. Pleonaste, iolite.
Do.	.. Silico-magnesite	.. Chrysolite.
Do.	.. Ferro-magnesite	.. Olivine, condrodite.
Do.	.. Calc-silico-magnesite	.. Serpentine.
Do.	.. Hydro-silico-magnesite	Steatite, chlorite.
5. YTTRITE	.. .. ..	.. Gadolinite.
6. ALUMINITE	.. ..	.. Aluminite.
Do.	.. Fluor-aluminite	.. Topaz, kollyrite.
Do.	.. Potassi-silico-aluminite	Mica.
Do.	.. Potass-aluminite	.. Lepidolite, nacrite.
Do.	.. Hydro-potass-aluminite	Haüyne, felspar, scapolite.
Do.	.. Calc-silica-aluminite	.. Meionite, sommite, talc.
Do.	.. Ferro-potass-aluminite	Schorl, killinite, mellinite, rubellane.
Do.	.. Potassi-calc-aluminite	.. Clinkstone, pitchstone, lava, basalt, pumice.
Do.	.. Hydr.-aluminite	.. Wavellite.

	New System.	Old System.
7. CALCITE ..	.. ..	.. Chalk.
Do.	.. Carboni-calcite	.. Carbonate of lime.
Do.	.. Stronti-calcite	.. Arragonite.
Do.	.. Magnesi-calcite	.. Bitter spar, pearl spar, brown spar, dolomite.
Do.	.. Phosphori-calcite	.. Apatite.
Do.	.. Fluori-calcite	.. Fluor.
Do.	.. Sulphuri-calcite	.. Anhydrite, vulpinite, gypsum.
Do.	.. Nitro-calcite	.. Nitrate of lime, dathalite.
Do.	.. Bara-magnesi-calcite	.. Boracite.
8. BARYTE ..	.. ..	.. Barytes.
Do.	.. Carboni-baryte	.. Witherite.
Do.	.. Sulphuri-baryte	.. Heavy spar.
9. STRONTITE ..	.. ..	.. Strontia.
Do.	.. Carboni-strontite	.. Strontianite.
Do.	.. Sulphuri-strontite	.. Celestine.

MINERALS PRINCIPALLY ACIDIFEROUS.

10. ..	.. Alumino-potassite	.. Alum.
Do.	.. Nitra-potassite	.. Nitre.
Do.	.. Carbo-sadalite	.. Natron.
Do.	.. Boro-sadalite	.. Borax.
Do.	.. Murio-sadalite	.. Salt.

CLASS II.

NATIVE METALS.

1. PLATINA ..	.. ..	.. Platina.
2. PALLADIUM	.. ..	.. Palladium.
3. IRIDIUM ..	.. ..	.. Iridium.
4. OSMIUM ..	.. ..	.. Alloy of iridium and osmium.
5. GOLD ..	.. ..	.. Gold.
6. SILVER ..	.. ..	.. Silver.
Do.	.. Antimonial silver	.. Antimonial silver.
Do.	.. Molybdic silver	.. Molybdic silver.
Do.	.. Sulphuret of silver	.. Sulphuret of silver.
Do.	.. Bismuthic silver	.. Bismuthic silver.
Do.	.. Carbonate of silver	.. Carbonate of silver.
Do.	.. Muriate of silver	.. Muriate of silver.
7. MERCURY ..	.. ..	.. Mercury.
Do.	.. Sulphuret of mercury	.. Cinnabar.
8. COPPER	.. Ferrate of copper	.. Grey copper.
Do.	.. Sulphuret of copper	.. Copper pyrites.
Do.	.. Oxide of copper	.. Red oxide of copper.
Do.	.. Carbonate of copper	.. Carbonate of copper, chrysocola.
Do.	.. Sulphate of copper	.. Blue vitriol.
Do.	.. Phosphate of copper	.. Phosphate of copper.
Do.	.. Arseniate of copper	.. Arseniate of copper.
9. IRON	.. Sulphuret of iron	.. Iron pyrites.
Do.	.. Aluminate of iron	.. White iron pyrites.
Do.	.. Magnetic sulpht. of iron	Magnetic iron.
Do.	.. Oxide of iron..	.. Oxide of iron.
Do.	.. Oligistic iron..	.. Specular iron.

	New System.	Old System.
9. IRON ..	Hydrate of iron ..	Red iron ore.
Do. ..	Hydro-silicate of iron ..	Brown iron ore.
Do. ..	Silicate of iron ..	Jaspery iron ore.
Do. ..	Carbonate of iron ..	Spathose iron.
Do. ..	Phosphate of iron ..	Blue iron ore.
Do. ..	Sulphate of iron ..	Green vitriol.
Do. ..	Chromate of iron ..	Chromate of iron.
Do. ..	Arseniate of iron ..	Arseniate of iron.
Do. ..	Oxalate of iron ..	Oxalate of iron.
10. MANGANESE	.. .. ..	Manganese.
Do. ..	Silicate of manganese ..	Siliferous oxide.
Do. ..	Oxide of manganese ..	Oxide of manganese.
Do. ..	Sulphuret of manganese	Sulphuret of manganese.
Do. ..	Carbonate of manganese	Carbonate of manganese.
11. ARSENIC ..	.. .. ..	Arsenic.
Do. ..	Sulphuret of arsenic ..	Realgar.
Do. ..	Oxide of arsenic ..	Arsenic bloom.
12. BISMUTH ..	.. .. ..	Bismuth.
Do. ..	Sulphuret of bismuth ..	Sulphuret of bismuth.
Do. ..	Carbonate of bismuth ..	Carbonate of bismuth.
13. ANTIMONY ..	.. .. ..	Antimony.
Do. ..	Sulphuret of antimony..	Grey antimony.
Do. ..	Oxide of antimony ..	Red antimony.
14. MOLYBDENA	.. .. ..	Molybdena.
Do. ..	Sulphuret of molybdena	Sulphuret of molybdena.
Do. ..	Oxide of molybdena ..	Oxide of molybdena.
15. TELLURIUM .	.. .. ..	Tellurium.
16. TIN	.. .. ..	Tin.
Do. ..	Oxide of tin	Oxide of tin.
Do. ..	Sulphuret of tin ..	Sulphuret of tin.
17. TUNGSTEN ..	.. .. ..	Tungsten.
18. TITANIUM ..	.. .. ..	Titanium.
19. SPHENE ..	.. .. ..	Sphene.
20. CERIUM ..	.. .. ..	Cerium.
21. URANIUM ..	.. .. ..	Uranium.
22. COLUMBIUM..	.. .. ..	Columbium.
23. CHROME .	.. .. ..	Chrome.
24. COBALT ..	.. .. ..	Cobalt.
Do. ..	Sulphuret of cobalt ..	Sulphuret of cobalt.
Do. ..	Arseniate of cobalt ..	Bright white cobalt.
Do. ..	Oxide of cobalt ..	Cobalt bloom.
Do. ..	Sulphate of cobalt ..	Red vitriol.
25. NICKEL ..	.. .. ..	Nickel.
26. LEAD ..	.. .. ..	Lead.
Do. ..	Sulphuret of lead ..	Galena.
Do. ..	Carbonate of lead ..	Carbonate of lead.
Do. ..	Muriate of lead ..	Muriate of lead.
Do. ..	Phosphate of lead ..	Phosphate of lead.
Do. ..	Arseniate of lead ..	Arseniate of lead.
Do. ..	Sulphate of lead ..	Sulphate of lead.
Do. ..	Molybdate of lead ..	Molybdate of lead.
27. ZINC	.. .. ..	Zinc.
Do. ..	Sulphuret of zinc ..	Blende.
Do. ..	Red oxide of zinc ..	Red oxide of zinc.
Do. ..	Carbonate of zinc ..	Carbonate of zinc.

CLASS III.

INFLAMMABLE MATERIALS.

	New System.	Old System.
DIAMOND..	.. .. ..	.. Diamond.
SULPHUR	.. .. ..	.. Sulphur.
COAL ..	.. .. ..	..
Do.	.. Bovey coal ..	.. Bovey coal.
AMBER ..	.. .. ..	..

Here we have, then, comprised under three heads, the products of the mineral kingdom—the chemical name either denoting one or a class of several minerals, as stated.

Let us now look at the peculiarities of minerals, and the reference they have with other sciences. It may, perhaps, be at first rather disheartening to the student of mineralogy if he be told that several sciences are the natural accompaniments of this one, though the knowledge of all is not necessary in all cases. The thorough practical mineralogist alone requires them all, so as to be able to turn them to account in ascertaining a mineral body; on the contrary, a person wishing only to be able to distinguish one from another, may be content with the outward signs, or physical mineralogy, as I term it.

The three sciences of mineralogy, chemistry, and physics, are so connected together that the one naturally leads to the other. Suppose we have a mineral unknown to us, which we wish to find out, agreeing in physical character with many other varieties, the first mode of distinction resorted to for analysis is chemistry, as the most certain method of distinguishing them. Should crystallography be your particular branch, you cannot proceed well without a knowledge of mathematics, and more particularly of geometry. Again, if we view the connection this science has with geology—two sciences, although entirely different, very intimately connected, as being branches of one and the same, we find we are led on to contemplate natural history, in the form of fossil osteology, fossil botany, and fossil conchology—all of which sciences have a reference to physics. The great revolutions which have taken place on the surface of our earth have been the effects of mechanical compression in some instances, and of a general eruption, caused likewise by the physical agency, in others.

Minerals have general characteristics by which they may be distinguished from one another. These characters are—solidity, liquiform or æriform, colour, taste, smell, appearance, porosity, opacity, lustre, and tenacity. Most minerals are sold in their native state, though they change appearances, perhaps, when exposed to heat; and a few occur liquid, as mercury, which on exposure to heat assumes the æriform state. The colour of

minerals is a very prominent distinguishing mark, by which in many cases the species of a mineral may be made out, and the diversity of shades of one colour makes it in some cases a matter of no little difficulty to be able to do so. There is scarcely a colour which is not to be found in the mineral kingdom, and many, of great use, are found in it only. Another distinguishing mark is taste, though it is rarely resorted to. Clayey minerals have a very peculiar taste, as also some metals, as arsenic and iron. The smell is not always to be detected, though in most cases a clayey substance can be told by the smell which it gives out when breathed on. By appearance the species of a mineral is detected, as, for instance, whether it is mammillated, compact, crystallized, earthy, or so on. When accustomed to the sight of minerals, it is by appearance almost entirely that you determine a mineral, though it would be impossible to do so at first; but the eye becomes gradually accustomed to its form, colour, and general characteristics, till at length it is enabled to determine with almost unerring certainty not only the mineral itself, but also the variety to which it belongs. Very few minerals are porous to the eye (that is, penetrated by holes), though numbers are invisibly perforated by very minute openings between the pieces. Pumice is visibly porous, and absorbs water easily. Some minerals are opaque, that is, they do not permit the rays of light to pass through them; whilst others, as quartz, are in some cases so transparent, that objects may be distinctly seen through them—this we denominate transparency; or, when the contrary takes place, opacity.

Zirconite (*zircon*, Phillips; *jargon*, Romé de Lisle; *zirkon*, Werner).—This class of minerals is divided into three orders: the zircon, jargoon, and hyacinth, all of which differ but little in their composition; their external colour is also much alike, varying from red to grey, and rarely green or white, and they all occur crystallized. The primitive form is an obtuse octahedron, and it occurs principally in the form of a rectangular four-sided prism, truncated on the lateral edges. It possesses the property of double refraction in some degree, specific gravity 4·557. Before the blowpipe this class of minerals is infusible, and the analysis of Klaproth determines its composition to be zirconia 69, silica 26·50, and oxide of iron 0·50. In the hyacinth the iron is much more abundant, being on an average about two per cent. It occurs in Auvergne, near Enpailly, in a volcanic sand; in Spain, Silesia, Italy, and Bohemia; and it occurs in sienite in Norway. It is also found in Ceylon, Siberia, and Java, and is of frequent occurrence in the primitive rocks of North America. The zirconite of Phillips occurs in the same form, though sometimes the chemical composition varies by the addition of a small quantity of titanium. The colour of all the classes of zirconite can be destroyed by heat.

GLUCINITE (*emerald*, Phillips ; *smaragd*, Werner). — This class, which includes those minerals commonly known by the name of emerald, euclase, and beryll, derives its name from the chemical element *glucina*, which is contained in all the varieties (and in this class only) ; whence its rarity. The colour of all the varieties is a green, of different degrees of intensity, sometimes passing into bluish-green, and more transparent according to the size, the smaller varieties being almost entirely opaque. They all occur crystallized in small six-sided prisms, and the varieties are produced by the terminal angles being replaced by planes, or by the solid angles by triangular planes. The variety known by the name of *euclase* is exceedingly frangible. The constituent parts of the emerald are—silica, 64·5 ; alumina, 16 ; glucina, 13 ; oxide of chrome, 3·25 ; lime, 1·6 ; and water, 2 ; and its colour is believed to be owing to the presence of chrome. It is found principally in Peru ; it also occurs in Salzburg, and in Ethiopia. It is principally met with in primitive rocks, more particularly mica-slate, though sometimes in the sand of rivers. Its colour causes it to be much used in jewellery, though the pure transparent varieties are scarce. The beryll (alumino-glucinite) is hardly distinguishable from the emerald, on account of its strong resemblance in outward appearance. The crystals of the beryll are longer than those of the emerald, and the proportion of glucina is smaller in this variety than in the former. The specific gravity of this class is from 2·650 (Werner) to 2·722 (Brisson), and the varieties are all with difficulty fusible before the blowpipe.

SILICITE (*quartz*, Phill., Jamieson ; *quartz*, Werner).—It comprehends a great variety of minerals, differing only in their colour and outward appearance, their composition, with the exception of a foreign metal, to which the different varieties owe their colours, being the same. They occur both massive and crystallized ; the regular form is a six-sided prism acutely terminated, generally in groups, and rarely single. When two pieces of quartz are rubbed together, they become phosphorescent, which property is very visible at times. Silicite, as its name denotes, consists almost entirely of silex, this earthy element being in the proportion of 99, with 1 per cent. of water of crystallization. The white quartz occurs in almost every country—in primitive rocks, with various metals and earths, and sometimes beautifully aggregated. In England the finest specimens are from Cornwall ; in France from Dauphiné and Auvergne ; and also in the Alps, Bohemia, Saxony, and Sweden ; and in the New World and the remaining continents it is equally abundant.

Purple quartz, or amethyst, is a variety in which alumina enters into the composition, though in a very small proportion, and in some specimens a trace of manganese has been detected (*vide*

Rose Karsten's Tabell, s. 23). It is found in Scotland and Ireland, in Sweden, Saxony, Spain, France, and Hungary, both massive and crystallized, and also near Guanaxuato, in Mexico. Its colour is a bright purple or violet, bordering on pearl grey.

Rose quartz is distinguished again by its colour, which is supposed to be produced by manganese, and, like the preceding variety, occurs both massive and crystallized. It is found in Bohemia, Bavaria, Spain, and France, and in Greenland and the United States in North America.

Yellow quartz has received the various appellations of Cairnghorm topaz and Bohemian topaz, on account of the resemblance it bears to that beautiful gem, and from its locality; and in addition to the above-mentioned places, it occurs in several of the mines in Cornwall.

Ferruginous quartz is the result of the admixture of a considerable portion of iron with the silex, which gives it a rusty brown opaque appearance, by which it is characterized. The German name Eisenkiesel (iron gravel), implies at once its composition; and the appearance of some of the specimens of this variety of quartz bears a strong resemblance to gravel, though the terminated six-sided prism is still preserved. It is found in Saxony, Bohemia, Spain, Altenburg, Siberia, and North America.

Brown quartz accompanies the yellow varieties in most of its localities, and is generally of a smoky brown colour, whence its French appellation—Quartz hyalin enfumé.

Hyalite is a variety of quartz which is found investing the cavities of rocks, somewhat similar to silicious sinter, though more transparent. It occurs in Tuscany, Silesia, Germany, near Frankfort, and Mexico.

Arenaceous quartz, or sand, is a variety of quartz of so common occurrence that I need hardly make any mention of it. It is conjectured to have originated from the destruction of quartz. Its colour, which is principally yellowish-white, passes into every shade of the various blue, green, black, red, and yellow tints.

HYDRO-SILICITE (includes *opal, hydrophane, menilite, flint*).—This is the second class in the silicious genus, and its composition varies from a small to a larger proportion of water with silica; for though the preceding class contains a small proportion of the same water of crystallization, the minerals in that class cannot be reckoned under this head. The *hyalite* is the only one which approaches this chemical composition, the average of water being about 6 per cent. The *cat's-eye,* the most precious of the class denominated opal, occurs in small grains, of a yellowish or brownish grey colour, and imbedded in sand or primitive rock. *Precious opal* is nearly allied to this mineral, and contains 19 per cent. of water, the only difference being the size

in which it occurs, and the additional splendour, on which account it has received the name of *fire opal.* It occurs in primitive rocks, very frequently lining cavities in those of plutonic origin, and though not abundant, it is met with in various places, more particularly in the Alps, in Bohemia, at Freyberg, and in North America. (Phillips has accounted precious opal and fire opal different varieties; *vide* Phillips, Min. p. 9.) *Common opal* is intermediate between this last variety and the *semi opal,* possessing the resinous appearance of the former, but approaching the latter in opacity. The colour is principally yellow, though it is found of various shades of grey, and it occurs more frequently than any variety of opal; the finest specimens, however, are from Cornwall. The *semi opal* is known by its decided opacity, and is in general striated, some parts being more transparent than others, though it is sometimes uniform in appearance. The very beautiful variety, known by the name of *wood opal,* occurs in Hungary, and is generally of a silky-white or yellowish-white colour, tinged in places by iron; it is much lighter than the preceding varieties, and is easily distinguishable by its fibrous, wood-like appearance.

Hydrophane is nearly allied to the foregoing class of minerals, both in general appearance and composition; the only difference is, that the proportion of water is smaller than in the preceding varieties, and consequently it is considered a variety of opal. It occurs in Bohemia, Saxony, and South America.

Menilite (*leber opal,* Reuss; *menilith,* Leonhard).—It is of a slaty texture, somewhat approaching the appearance of chalk, and nearly allied to semi opal. It contains 12 per cent. of water, and is found in the formation round Paris. *Flint* occurs of a variety of colours, generally, however, of shades of grey and black; it contains a smaller quantity of water, but little more than 3 to 4 per cent., and in some cases even less. It is found in the chalk formations in regular beds, and in nodules which frequently contain quartz crystals. The specific gravity of this class averages about 2·50, and the appearance is intermediate between silicite and *alumino-silicite.*

Alumino-Silicite (*chalcedony, onyx, plasma, heliotrope, chrysoprase, cornelian, agate, jasper, hornstone*).—It forms a very important division of the silicious minerals, both on account of the number of specimens which are classed under it, and also on account of their splendour; for this reason they are much employed for ornamental purposes. The *common chalcedony* is nearly allied to flint in appearance when broken, though the botryoidal form in which it occurs at once distinguishes it from that mineral. It contains 16 per cent. of alumine, and 84 of silex. Its colour is grey for the most part, and semi-transparent or translucent. It occurs in almost every country of both hemispheres, and the finest specimens are from Siberia and

Hungary. *Onyx* is formed of layers of brown and white chalcedony, and is used in jewellery. In combination with *sard*, a mineral of the same class, but of a reddish-brown colour, it forms *sard-onyx*, an alternation of the sard with layers of white chalcedony. *Plasma* is a variety of chalcedony of a light-green colour, over the surface of which small red spots are visible. It is principally obtained in Moravia and Italy. The *heliotrope* is very similar to the foregoing species, the difference consisting in the colours being darker, and the red spots more positive; in some specimens, particularly in those from Bohemia, the red predominates. It is found also at various parts of Scotland and in Siberia, and is used in jewellery. *Chrysoprase* is of a fine green colour, generally uniform. Its principal ingredient is quartz (96 per cent.); and in addition it contains a small quantity of alumina and also lime. The finest specimens are from Greenland and Spain. The *cornelian*, another very useful gem, is of a beautiful red or white colour in some instances, sometimes uniform, at others beautifully marked in a circular form. It is of frequent occurrence, being found not only in different countries on the Continent, but also in considerable quantities on the coasts of Scotland and Wales. Being softer than common chalcedony, it is used for engraving, and it bears a very high polish. *Agate* is a compound mineral, composed of alternate layers of different varieties of chalcedony; for instance, the common chalcedony and cornelian with amethyst, white quartz, and hornstone, but the first-mentioned minerals predominate. The fortification agate derives its name from its appearance, as do the moss, and also the ribbon agates. The most beautiful varieties are from Oberstein, mostly occurring very large, and of which I have several very fine specimens. The *jasper* is a similar mineral, though the ingredients are not so numerous, silex still predominating, with a small quantity of iron and alumina. It is found in Cornwall and on most of our coasts, and in great quantities in Egypt, and was mentioned at very early times as being of great use for ornamental purposes. *Hornstone* has not been carefully analyzed, though in most cases where chemistry has lent its aid to the detection of its constituents, a portion of alumina has been found. It is found in Wales, Bohemia, France, and Sweden. *Wood-stone* is a variety of this mineral. The specific gravity of this class varies from 2·50 to 3·10, and the minerals included are all infusible without addition before the blowpipe. Proceeding according to the chemical arrangement, the next in order is the class Calc Silicite, including the minerals known by the name zeolite and its varieties—*silicious sinter*. (*Vide* Jamieson, vol. i. p. 351, and other authorities.) This class is more numerous in elements, containing a large proportion of alumina, and in some cases potash in addition to the silex, though the lime is the

characteristic ingredient, whence it derives its name; for though it occurs only in a small proportion, it is an ingredient in every variety in a greater or less degree. *Leuzite* is of a white or grey colour, occurring crystallized in igneous rocks, more particularly in the lavas of Vesuvius and Etna. *Analcime* contains 10 per cent. of natron in addition to the silex, alumina, and lime; its colour is white, of various shades, seldom occurring massive, but generally in crystals, the primitive form of which is the cube. It is found in the island of Skye, in Scotland, in Perthshire, Bohemia, and in the Hartz. *Chabasite* approaches the foregoing variety in the proportion of its ingredients and general appearances. It occurs mostly crystallized, and the primitive form is the rhomboid. The localities are in the islands of Mull and Skye, at Oberstein, and in Greenland. *Cross-stone* derives its name from its form. In general it contains but little lime, though in varieties from Bilin in Bohemia, 2 per cent. have been detected on analysis with care, whereby it retains its place in the class which we are now examining. It accompanies the preceding varieties in all the localities in which they are found. *Laumonite* contains from 9 to 11 per cent. of lime, and is the accompanying mineral of all the other varieties. *Needle zeolite* is found in the cavities of the basaltic pillar of the Giant's Causeway and of Staffa, occurring massive and in distinct concretions (*mesotype*, or common fibrous zeolite, is another name for the massive needle zeolite). *Apophyllite* contains a very large proportion of lime, and, according to the analysis of Vauquelin, of a variety from Utoen, as much as $28\frac{1}{2}$ per cent. It occurs most frequently massive, and not unfrequently crystallized, in Greenland, Bohemia, and Saxony. *Stilbite* is the radiated zeolite of Jamieson, and is nearly allied to apophyllite. *Silicious sinter* is the deposit of the silex contained in the water of the geysers, and is generally found stalactitic. Its specific gravity is little more than 1·5; it contains but little lime. The properties of this class are very decided, except in the last variety, with the exception of which, the average specific gravity is 2·30; they all occur in rocks of plutonic origin, and are all fusible with intumescence before the blowpipe.

FERRO-SILICITE contains *lievrite*, *garnet*, and *cinnamon-stone*.

LIEVRITE (*yenite*, Haüy).—It is of a brown or black colour, varying in intensity, and it occurs amorphous and crystallized. In composition it resembles garnet, with the exception of lime, which is the peculiarity of this mineral, whilst the proportion of iron is nearly the same as in the preceding class. This rare mineral has only been found in Corsica. Its name is derived from its discoverer, Le Lievre.

GARNET (*grenat*, Haüy; *granat*, Leonh.) comprises a great variety, which differ very materially in some points from one another. The garnet of jewellery (*almandine*) is of a beautiful

reddish-brown colour, sometimes having a tendency to become yellow. It occurs principally in primitive rocks, crystallized in the form of a rhomboidal dodecahedron, and less frequently granular. The most beautiful varieties are from Pegu, and others, though sometimes larger, but not so brilliant, are from the Alps, Bohemia, Italy, Brazil, and Ceylon. The *common garnet* differs but little from the precious, both of them occurring (crystallized) in the form of a rhomboidal dodecahedron, though the common garnet is more frequently granular, but it is softer than almandine, and is not employed for ornamental purposes, on that account. It is a very abundant mineral, occurring principally in mica-slate, gneiss, and sometimes in granite. In the mountains of Styria they are met with upwards of two pounds in weight. (*Vide* Phillips's Mineralogy, p. 28.) The name *pyrope* has frequently been given to common garnet, but it differs, on account of the magnesia it contains. The following are varieties of garnet:—

Pyreneite.—Colour is greyish-black, and it occurs crystallized. Before the blowpipe it loses its colour. Locality is the Pic of Eres Lids, in the French Pyrenees.

Grossulare.—Its colour is grass-green, and it likewise occurs crystallized in the form of the dodecahedron. It melts before the blowpipe. Locality is near the river Wilni, in Siberia.

Melanite.—Its colour is greyish-black, or velvet-black, and it occurs in roundish grains, and also crystallized in the common form of the garnet. Locality is Frescati, near Rome, and Monte Somma, near Naples.

Allachroite.—Its colours are greenish-grey and yellowish-grey. It changes colour before the blowpipe. Locality, Vilus iron-mine, near Drammen, in Norway.

Collophonite.—Its colour is yellowish-brown. It occurs massive, and crystallized in rhomboidal dodecahedrons. It is found at Arendahl, in Norway, and Piedmont.

CINNAMON-STONE (*kanelstein*, Werner; *essonite*, Haüy).—Its colour is in general a bright red, passing into orange-yellow. It occurs massive, of a shining appearance. Specific gravity is 3·61. It occurs in Ceylon, in granite rock, and in alluvial deposits. The average specific gravity is 2·50, and the percentage of iron varies from 13 to 45 per cent.

CALCALUMINO-SILICITE (comprises *idocrase*, *prehnite*, *heulandite*, *Thomsonite*, *scolezite*, *Wernerite*, *epidote*, and *Indianite*).—The strong resemblance which exists in the chemical composition of the different minerals of this class, necessarily causes the physical mode of determination to be used to make a further distinction, and I shall therefore reserve the chemical description till I have completed the enumeration of the physical properties of each.

IDOCRASE (*Vesuvian*, Werne; *idocrase*, Haüy) is of yellowish

or greenish colour, sometimes occurring massive, though more frequently crystallized. It possesses the property of double refraction. This mineral occurs principally in volcanic districts, particularly in the regions near Vesuvius and Etna, and it is likewise found in the primitive districts of the Alps and Siberia.

PREHNITE (*prehnite*, Werner and Haüy ; *Prehn spath*, Mohs). —The origin of the name of this mineral may be attributed to the circumstance of its having been first brought from the Cape of Good Hope by Colonel Prehn. Its colour varies from yellowish to greenish white, and is slightly translucent. Among the situations in which this mineral is found, that of Oisans, in Dauphiné, is perhaps one of the most interesting, on account of the various minerals with which it is combined. It is likewise found in Bohemia and in the Alps. In America fine specimens are obtained in Greenland.

Heulandite derives its name from its discoverer. It consists of the same earths as the preceding variety, and its colour varies from red to brownish-grey, and it occurs in small quantities in Scotland and Dauphiné.

Thomsonite and *scolezite.*—Varieties of the same class of minerals, similar to the preceding kinds in every respect except colour. The Thomsonite is of a brownish-white hue, occurring radiated and fibrous ; the scholezite in general very minutely crystallized or massive, and of a greenish-white colour. The localities of these minerals are nearly the same as those of the last-named.

Wernerite is a rare mineral, occurring of a greenish-grey colour, imbedded in primitive rocks, and very rarely crystallized. It occurs principally at Arendahl, in Norway, in Sweden, and Switzerland.

EPIDOTE (*pistacite*, W. ; *thallite*, Karsten) is found in a variety of forms, principally massive, though often crystallized and granular ; the colours are also various, occurring green, yellow, blue, or black, and it belongs exclusively to the primitive groups of rocks. It is a mineral found in great quantities in districts of all the above-mentioned formations in this country, in France, Transylvania, and in Guernsey. The localities in America are likewise numerous.

Zoisite, like other minerals, derives its name from the person who first found it. The colours are shades of yellow and grey, and in composition it resembles all the varieties of this class. It is found is Carinthia, at Salzburg, and in the Tyrol. The general properties of this class are—a less degree of hardness than most of the minerals of the silicious class, melting before the blowpipe, and composition, on an average, 40 per cent. silex, 35 alumina, 20 lime, and iron or manganese the remainder.

Indianite.—This mineral is of rare occurrence ; it is of a whitish or greyish colour, and of a shining lustre. It is trans-

lucent, and inferior but little in hardness to quartz. Bournon mentioned it as forming the gangue of Corundum, in the Carnatic. (*Vide* Phillips, p. 37.)

Ferro-Calc-Silicite (includes *axinite*, *lapis lazuli*, and *dipyre*).

Axinite (*Thumerstone*, J.; *axinit*, Leonh.).—The English name is derived from the form of the crystals, and Thumerstone is from its locality at Thum, in Saxony. It occurs crystallized, the primitive form being a right prism. Its colour is a fine brown, though some specimens, from containing a quantity of chlorite, are of an opaque green. It is by no means abundant, lining the cavities of primitive rocks in Saxony, in the Alps, in Norway, and in the Botallack mine, at Land's End, in Cornwall.

Lapis Lazuli (*lazurstein*, Leonh.; *azure stone*, T.).—This mineral, from which the ultramarine is extracted, is of a fine azure-blue colour. It is principally found in the massive state, though mention has been made of crystallized lapis lazuli. It is found imbedded in primitive rocks, in which iron pyrites are disseminated. The finest specimens are from Persia.

Dipyre (*schmelzstein*, Werner) is a mineral of great rarity, occurring of a reddish-white colour, and massive. It is found at Mauleon, in the western Pyrenees. It melts with intumescence before the blowpipe, and it contains but little iron.

Ferro-Alumino-Silicite (includes *tourmaline*).—Like some of the varieties of silicites, the colours of this class of minerals vary considerably, on which account I have reserved the descriptions of them till I mention the different sorts. All the varieties occur in prisms striated longitudinally, mostly in the primitive formations. Some are transparent, some translucent (blue is transparent, green translucent, pink and black are opaque). Frequently it is found in six-sided prisms, which possess the property of electricity. Specific gravity is 3.

Blue tourmaline, of a transparent blue colour, occurring at Utoen in Sweden, and in the State of New York.

Green tourmaline is of a light grass-green colour, generally translucent, though often opaque; found at Ceylon and in Brazil. Very fine specimens are found in the primitive rocks of the Alps. The colour is the result of the admixture of manganese.

Pink tourmaline is of an opaque pink colour, occurring in long striated prisms in primitive rocks. Very fine specimens are obtained in Bohemia.

Black tourmaline is the commonest of the varieties of tourmaline. It occurs principally in quartz rock in large crystals, or in veins traversing the same rock. It is also found in small crystals in the granite of Heidelberg, and it is frequent in Cornwall, Scotland, and Ireland. All these minerals melt into a pale glass before the blowpipe.

Hydr.-Alumino-Silicite (includes *clay*, *slate*, and *fahlunite*).—This is another large division of minerals. As a general mode of distinction, these never occur crystallized, and belong to the secondary group of rocks.

Wacké occurs massive, of a green, grey, or yellowish colour, and is somewhat greasy to the touch, yielding easily to the knife. It occurs in districts of volcanic origin.

Common clay occurs of a variety of colours, generally yellowish-grey, sometimes brownish-grey (London clay), of a soft appearance, and possessing when damp considerable tenacity, whilst some varieties when dry are exceedingly brittle. It is found in alluvial countries, on the banks of most rivers, and at the deltas of some few. Fossil remains, both of crustacea and plants, are frequent in the London clay. Above this formation rests the "loam," commonly known by the name of "brick earth." In appearance it is sandy, containing very few fossils.

Plastic or potter's clay derives its name from its tenacity. Its colour is generally greenish, and it is much employed in the fabrication of the common varieties of pottery. Teignmouth in Devonshire yields considerable quantities.

Shale (*slate clay*, Phillips) occurs above the coal in the carboniferous districts of this and other countries. It occurs massive, and generally of a greyish-green and blue colour. It is abundant in the production of fossil plants, among which are several varieties of ferns.

Rotten-stone is of a brownish-red colour, very soft, and contains, according to the analysis of R. Phillips, 86 of alumina, 4 of silex, and 10 of carbon. It is believed to originate from the decomposition of shale, and is found in Derbyshire.

Tripoli has been found of various colours, generally of shades of grey, yellow, or red. It is of a very argillaceous appearance, and yields easily to the knife. It was originally brought from Tripoli, in Africa, but is now found in the department of Puy de Dome, in Saxony, and in Russia.

Polishing clay is another name of this mineral.

Lithomarg (*steinmark*, Werner; *argile lithomarge*, Haüy) is of a yellowish or reddish colour, frequently occurring spotted. It is soft, and adheres to the tongue. It is found in the porphyritic districts of Baden, and in Saxony.

Cimolite is of a grey colour, and generally occurs massive. It is found in the island of Cimola.

Bole is of a brownish, blackish, or blackish-white colour. It adheres to the tongue, yields to the nail, and when immersed in water, breaks to pieces. It occurs at the Giant's Causeway, in France, and in Silesia.

Mountain meal is so light as to swim in water. It is a rare mineral, and has only been found at Santa Tiora in Tuscany.

Pipe-clay is of a yellowish-white colour, and is known by a

slight greasy feeling to the touch. It is found in the chalk district in the neighbourhood of Handfast Point, in Dorsetshire.

Baryti-Silicite (includes *harmatome, amianthoide*).

Harmatome is nearly allied to cross-stone, but contains in addition to the constituent earth of the latter mineral, a proportion of barytes, varying from 3 to 9 per cent. It accompanies most of the varieties of zeolite in the localities in which they are found. Its colour is yellowish or brownish-grey. It occurs rarely massive, more frequently however crystallized.

Amianthoide resembles asbestos, both in colour and appearance; like that mineral, its colour is greenish-grey, and it is also flexible. In a specimen from Oisans 6 per cent. of barytes has been detected.

Magnesi-Calc-Silicite (includes *augite, sahlite, fassaite, hornblende, pargasite, hedenbergite*, and *carinthin*).

Augite is found generally in crystals, and forms an ingredient of several rocks; its form is an eight-sided prism, with diedral summits. The colour is in general brown or brownish-black, and exceedingly opaque. It is found in most of the volcanic regions, and also in Norway.

Sahlite is a variety of massive augite, and of much seldomer occurrence; it also occurs crystallized in the same form, and of a greenish-grey colour. Its name is derived from its locality, on account of being first found at the mine of Sahla, in Westmania.

Fassaite is a second variety of augite, though the colour differs materially, being a bright olive-green. It derives its name from being found in the Fassa Thal, in the Tyrol.

Hornblende is of a brown, or brownish-black colour, and resembles augite in appearance. It occurs massive, and disseminated in almost every rock. (In the granite of Bohemia, in many varieties of porphyry, and in syenite.) It is also found of a slaty appearance, and is abundant in almost every country. The primitive form of its crystals is an oblique rhomboidal prism. It is plentiful in Scotland, in many parts of Germany, and in Mexico.

The next mineral of this class is *pargasite* (*pargasite*, Haüy and Leonhard). It occurs disseminated in plutonic rocks, in small crystals. Its colour is a light green, approaching to a bluish-green, and it is found at Pargas, in Finland, whence it derives its name. The rhomboidal prism is the primitive form of the crystals.

Hedenbergite occurs both massive and crystallized, and of a greyish-green colour. It is a rare mineral, and occurs in the calcarious districts of Bohemia, accompanying the carbonate of lime.

Carinthin is another variety of this class, of a greyish-green colour, and occurring massive, though frequently granular or crystallized. It derives its name from its locality.

Magnesi-Silicite (includes *tremolite*, *schiller spar* and varieties, *anthophyllite*, *asbestos*, *kyanite*, *staurolite*).

Tremolite (*grammatite*, Brong.) derives its name from Tremola, a valley in the Alps, where it was first found, though from some accounts it appears to have been first found in Transylvania. The varieties of this mineral differ only in outward appearance, the constituent parts being nearly the same in all cases. It occurs granular, fibrous, asbestous, common and glassy. Its colour is generally greyish-white, though it likewise occurs of a yellowish or greenish tint; it is shining and very brittle. It is found in limestone in the Highlands of Scotland, and the common variety is frequent in Transylvania, Italy, and France. It likewise occurs in basalt in the Castle rock, at Edinburgh. All the varieties lose their colour if subjected to a great heat. Its composition gives rise to the name of the class; and in addition to the above-mentioned earth, there is a considerable proportion of carbonic acid. The average specific gravity is 2·800.

Actynolite bears a strong resemblance to the above-mentioned variety, the distinguishing mark being generally the colour, which is green, of a variety of shades. It occurs fibrous, massive, and in elongated crystals. It occurs in Saxony, in Dauphiné, and Cornwall, and from the first-mentioned locality very fine specimens are obtained. It bears some resemblance to pipe schorl, from which, however, it is distinguished by its glassy appearance.

Schiller spar (*schiller spath*, Leonh.; *smaragdit*, Karsten) is of a blackish-green colour, passing into olive-green, occurring both massive and in distinct concretions. It is softer than the next variety, from which it can be distinguished by its colour. It occurs in the Island of Skye and in other parts of Scotland, in Saxony, the Tyrol, and Cornwall.

Bronzite (*bronzit*, Leonh.; *blaettriger anthopyllite*, Werner; *argile metalloide*, Brong.).—Its colour is greyish-yellow, and it also occurs of a brown shade. It is generally found massive. It has a semi-metallic appearance and lustre, and is difficultly frangible. It occurs with the preceding variety, in the Island of Skye, and in the Styrian Alps, and it derives its appellation from its appearance. Another variety, denominated "hypersthene," or "Labrador schiller spar," is found in that peninsula with the felspar, and it likewise occurs in Greenland.

Anthophyllite (*anthophyllith*, Leonh.).—Its colour is yellowish-grey or brown. It occurs massive, rarely crystallized, and has a shining lustre. In addition to the characteristic constituents, it contains oxide of manganese, iron, and alumina. It occurs principally in Norway, in primitive rocks.

Asbestos.—This class is characterized by its property of resisting heat, and by its great flexibility, on which account it was

employed for weaving cloths which were used to collect the ashes of dead persons after they had been burnt; the value of the amianthus consisted in the length of the fibres, and it was woven with flax, which was afterwards burnt out. In Pliny's Natural History, it is described as growing upon a plant in the most desert regions, and its duration when exposed to the fire is accounted for by its never receiving any nourishment in the situations where it is found.

Common asbestos (*gemeiner asbest*, Leonh.; *asbest dur*, Brong.) is either of a greyish or greenish-white colour. It occurs massive, in distinct concretions closely aggregated, and it rarely occurs crystallized (Bournon's Cat. Min. p. 123). It is less flexible than asbestos; it occurs in greenstone and metalliferous beds, in the Island of Skye, in Cornwall, in various parts of Europe, and more especially in the Saxon Erzgebirge.

Amianthus (*biegsamer asbest*, Leonh.; *asbest amianthe*, Brong.).—The shades of colour of this mineral are nearly the same as those of the preceding variety, though it has been found blood-red. It occurs in fibrous concretions closely aggregated, and is flexible. It is found in the western islands of Scotland, in Cornwall, in Saxony, and Bohemia, and in Dauphiné in France, and considerable quantities are found in Italy. It also occurs in Asia and America.

Rock cork (*bergkork*, Leonh.; *asbeste subériforme*, Brong.).—This mineral has received the different appellations of "mountain cork," "mountain leather," and "mountain paper," according to the various degrees of thickness in which it occurs. The mountain cork occurs in thick masses, filling the cavities of rocks; is rather tenacious, and swims on water. The mountain leather and mountain paper occur in plates, varying in thickness, in serpentine rocks. It occurs in Scotland, at Johanngeorgenstadt in Saxony, in Italy, France, and Norway. The specific gravity is 2·410.

Kyanite, or *cyanite* (*cyanit*, Leonh.; *disthène*, Brong.).—Its colour is a pale blue, though sometimes it occurs grey or green. It occurs massive, and rarely crystallized, and has a splendent lustre. Some crystals acquire negative electricity by rubbing, others positive. It is found in primitive mountains in Scotland, the Alps, Saxony, Bohemia, Spain, and the Tyrol. It occurs at Airolo on Mount St. Gothard, in a beautifully white mica-slate. It has also been found in Asia and in America.

Staurolite (*staurotide*, Brong.; *grenatite*, Jamieson; *grenatit*, Werner).—It is of a reddish-brown colour, occurring only crystallized and opaque. It is found in primitive rocks, accompanying garnet, in Scotland, in the Tyrol, in Spain, France, and the Alps, and in America. This mineral generally contains but little magnesia, though in the specimens from St. Gothard from 1·5 to 2·0 per cent. is found, which gives it its place in this class.

The average specific gravity is 3·00, and all the minerals are difficultly fusible before the blowpipe.

Potassi-Silicite (includes *jade, obsidian, gabronite, petalite*). *Jade* (*saussurite*, Saussure ; *jade de saussure*, Brong.).—Its colour is pea-green, passing into grey, occurring massive, and very hard. It is found in Italy, and recently in New Zealand.

Obsidian (*obsidian*, Leonh. ; and *obsidienne*, Brong.).—Its colour is black, generally very intense, sometimes uniform, and at other times striped. It is found in Spain, in Ireland, in Siberia, and in the South Sea Islands. It was used by the ancients for mirrors; and by the Spaniards, Mexicans, and Peruvians, it was used for knives, and Mr. Burkart describes the Serra de las Novajas, or mountain of knives, in his work on Mexico. It is a volcanic production, resembling glass. It has been long known, and is spoken of by Pliny under the name of "obsidius." The transparent varieties have received the name of "marekanite."

Gabronite (*arcticit*, Werner) is of a greyish-green or greenish-black colour; it occurs both massive and crystallized, though the former is the most common mode of occurrence, and it is very brittle. It occurs in the Saxon Erzgebirge, and is classed under the head of scapolite by Jamieson.

Petalite is of a greenish-grey colour, and, like the preceding variety, occurs both massive and crystallized. It occurs in Saxony, Bohemia, and the Alps.

Magnesite.—This class of minerals derives its name from magnesia being the characteristic ingredient, though, as in some other cases, it is not predominant. In its pure state this earth is of a white colour and earthy taste, with a specific gravity of 2·50.

Hydro-Magnesite contains *hydrate of magnesia* (*reine talkerde*, Leonh. ; *magnesite*, Brong.).—Its colour is yellowish-grey or white; it occurs massive, and it adheres to the tongue. From the analysis made by Bucholz, it contains 48 per cent. of magnesia, and the rest is carbonic acid and water. It is found in Moravia in serpentine rocks, and in Italy.

Meerschaum (*meerschaum*, Leonh. ; *écume de mer*, Brong.) is of a greyish-white colour, and occurs massive; it is soft, and adheres to the tongue. Specific gravity, 1·723. It is found in Cornwall, in Moravia, and near Thebes, and also in Asia; in Turkey it is used for the manufacture of pipes, and in Spain it is employed in the manufacture of porcelain.

Alumino-Magnesite contains *pleonaste, iolite.* Both these minerals are rare.

Pleonaste (*pleonast*, Mohs. ; *spinelle pléonast*, Brong. ; *ceylanite*, Jamieson) is of a dark green colour, approaching black. It occurs in grains, and crystallized of an octahedral form. It was originally brought from Ceylon, and it is more or less met with in the different volcanic districts.

Iolite (*iolith*, Werner; *iölithe*, Haüy) is of various shades of dark blue, occurring both massive and disseminated, though rarely crystallized. Besides the characteristic constituents, it contains a large quantity of silica. It is found at Salzburg, at the Bay of San Petro, in Spain, and Mr. Heuland's collection contains several very fine specimens of the crystals of iolite from Greenland. It is used as a gem, though its brilliancy is not very great.

SILICO-MAGNESITE.—*Chrysolite* (*chrysolith*, Leonh.; *peridot chrysolithe*, Brong.).—It is of an olive-green colour, translucent, and sometimes transparent. It occurs both crystallized and in grains, and the primitive form is a prism. In addition to magnesia and silica, it contains from 10 to 19 per cent. of iron. It is found in the sand of rivers in the south of Europe, and is brought from the Levant and Upper Egypt.

FERRO-MAGNESITE.—*Olivine* (*olivin*, Leonh.; *peridot olivine*, Brong.) is of an olive-green colour, generally occurring disseminated or in grains, though sometimes massive and crystallized, which, however, is rarely the case. It likewise contains a large per-centage of iron, and it is found in igneous rocks, accompanying augite. Its principal localities are the islands of western Scotland, Iceland, Saxony, Bohemia, Hungary, Italy, Spain, and France; in Africa, in the island of Bourbon, and in Greenland in America. It is difficultly distinguishable from chrysolite, though in general its colour is less intense.

CONDRODITE (*condrodit*, Leonh.) is of a yellowish or reddish-white colour, slightly translucent, and of lamellar structure. It occurs principally massive, and rarely crystallized. It is found at Ersby in Finland, and it contains 22 per cent. of iron.

CALC-SILICO-MAGNESITE contains the class of *serpentine* (*serpentin*, Leonh.; *serpentine*, Brong.), which is divided into two kinds,—common and precious. They are both of a green colour, of different kinds of intensity, in which white veins are frequent. They only occur massive, and have a splintery fracture, and are difficultly frangible. They occur in beds of considerable size in various parts of Scotland and Cornwall, and in Europe, and are found in the Alps, in the Tyrol, and Saxony. When polished, it is a very fine marble, and is much esteemed. The precious serpentine is, however, rare, and bears a much finer polish than the common variety. The specific gravity is 2·561, and they are both infusible before the blowpipe.

HYDRO-SILICO-MAGNESITE (contains *steatite* and *chlorite*).

Steatite (*speckstein*, Leonh.; *stéatite commune*, Brong.). — Its colour is white, passing in various shades of yellow, grey, brown, and reddish-white. It occurs massive and in six-sided prisms and rhomboids, and is soft, possessing a greasy feel, without adhering to the tongue. Its specific gravity is 2·671. It traverses serpentine in the form of small veins, and accompanies

some of the metals in their situations. It is met with in Cornwall and Wales, and also in Scotland, and on the continent in all those countries in which serpentine is found. A very beautiful spotted variety is brought from China, where it is employed in manufacturing small figures and other ornaments. French chalk is a preparation of steatite, and is much used for marking on cloths, as the trace is very difficult to be removed, and it is employed as food by the savage tribes of Asia and America, who mix it with flour. The variety from China has received the name of "figure-stone," or "agalmatolite" (*agalmatolit*, Leonh.), and it differs from steatite only in its colour, being somewhat of a darker shade.

Chlorite (*chlorite*, Brong.; *chlorit*, Leonh.) has received a variety of additions to the name, denoting the state in which it occurs; thus the common slate occurs massive, the chlorite slate in beds, and "green earth," when it assumes a green colour and earthy appearance. It is frequently found enclosed in crystals of quartz and adularia, to both of which it imparts a green colour, and the colour of all the varieties is more or less green. The localities, too, are much the same; all the varieties occur in Scotland, in Saxony, in the Alps, particularly Mount St. Gothard, where it encrusts the axinite; and in France in Dauphiné. Some specimens contain iron, which, however, is absent in that brought from Dauphiné, so that it cannot be counted a constituent part. Its specific gravity is 2·612, and it melts into a black slag before the blowpipe.

Yttrite comprehends only one known mineral, which is in itself extremely rare. The properties of the earth are not fully ascertained, though, like all the others, it is white in its native state.

Gadolinite (*gadolinit*, Leonh., Brong., Haüy).—It is of a black colour, very intense, and sometimes flesh-red. It occurs massive in prismatic concretions, and very rarely crystallized, its primitive form being an oblique four-sided prism. It is very brittle, and its specific gravity is 4·082. It contains 45 per cent. of yttria, besides a considerable portion of silica and cerium. It occurs at Finbo in Sweden, and at Ytterby in Roslagen; when exposed to the action of nitric acid, it loses its colour and forms a gelatinous material.

Aluminite is a very important class of earthy minerals, containing some of the most common minerals. When pure, the earth is of a white colour, and heavier than silex. There is one mineral which bears the characteristic name of this class, viz.

Aluminite (*reine thonerde*, Leonh.; *argil native*, Brong.).—Its colour is either white or yellowish-white, and it only occurs in small pieces, which absorb water, and slightly adhere to the tongue. Its composition is alumina 32·50, water 47·00, sulphuric acid 19·25, silica 0·45, lime 0·35, iron 0·45. (*Simon.* in

Allgem. Journ. der Chemie, 5 Jahrg. *S.* 137.) It has hitherto been only observed in Germany near Halle, and at Newhaven in England.

Fluor-Aluminite (contains *topaz, kollyrite*).

Topaz (*topaz*, Leonh., Brong.).—Its colour is yellow, passing from nearly white into very intense yellow. It occurs massive, though very seldom, but most frequently crystallized, of which the primitive form is an oblique prism. When exposed to heat, topaz becomes white, but the Brazilian topaz, on being similarly exposed, becomes rose-red. The topaz becomes electrical by friction, which property it retains for a considerable time. In addition to alumina and fluoric acid, it contains silica. In Scotland it is obtained from Cairinghorm, and it is also obtained in Cornwall. In Bohemia and Saxony this mineral is also found, and also at Hirschberg in Silesia. It is found in Asia in Ceylon, Pegu, Hindostan, and Kamscatka, and in America it is found at Villa Rica in Brazil. It is found in primitive rocks, either lining cavities, or aggregated with felspar, schorl, and quartz, whence it bears the name of "topaz rock." It has long been known, for mention is made of it in ancient history, when Cleopatra gave Antony a very fine stone; and in several mineral cabinets of Europe are engraved specimens of this gem. It is much valued for ornamental purposes. The Cairinghorm quartz bears a strong resemblance, but it may be distinguished by its want of brilliancy, and its not becoming electric by rubbing.

Kollyrite is another variety of this class. Its colour is brownish-yellow, inclining to straw-yellow, and it occurs massive and crystallized. It is found in Saxony and Siberia, and rarely in France.

Pyenite (*pyénite*, Brong.; *schoerlartiger berill*, Werner; *shorlite*, Kirwan).—Its colour is straw-colour, and it occurs massive, and crystallized in hexahedral prisms, which become electric by rubbing. Its constituent parts are—alumina, 51·00; silica, 38·43; fluoric acid, 8·84. (Berzelius.) It occurs at Altenberg in Saxony, at Slackenwald in Bohemia, and in Siberia. It is infusible before the blowpipe, but with borax melts into a white transparent glass.

Potassi-Silica-Aluminite embraces those minerals known by the name of *Mica* (*mica*, Brong.; *glimmer*, Leonh.).—Their colours are in general greyish-yellow and greenish-grey, passing into brown of various shades. It occurs in a variety of forms, according to the different situations which it occupies. It generally occurs in a slaty form, when it occupies many of the highest situations in chains of mountains, and is itself a primitive rock, succeeding the granite, into which it also enters as a constituent part. The slate is either fine or coarse-grained, and varies in colour in different situations, but for the most part is greenish-grey. It frequently contains precious garnet and pyrope, which are sometimes of a very large size. It also

occurs crystallized, and its primitive form is a rhomboid, the general figure, however, being an equi-angular six-sided table. Its lustre is semi-metallic, and it is flexible when it occurs in plates. Its specific gravity is 2·654, according to the analysis of Haüy. Its localities are too well known to need any description. It occurs in every country in which primitive rocks are met with, but the finest is from Siberia, where it is used for windows instead of glass. It is found on the banks of the Lena. Mica bears a strong resemblance to talc, from which, however, it can easily be distinguished by its greater brilliancy. Gold sand is merely a very fine variety of yellow mica with an extra metallic lustre.

Andalusite (*andalusit*, Brong.; *andalusit*, Leonh.) is of a flesh-red colour, occurring both massive and crystallized, in oblique four-sided prisms, and slightly translucent. It occurs entirely in primitive districts, accompanying felspar and quartz. Its composition is as follows: silica, 32; alumina, 52; potash, 8; oxide of iron, 2. (Vauquelin.) In England it occurs principally at Dartmoor in Devonshire, in Scotland in Aberdeenshire, and at Wicklow in Ireland. On the continent it is principally found in Andalusia, in Bavaria, and at Freyberg in Saxony.

Pinite (*pinit*, Brong.; *pinit*, Leonh.).—It is of a greenish colour, varying from olive-green to blackish-green. It occurs massive and crystallized, the general form of the crystal being an equi-angular six-sided prism. It has a slight greasy feeling, and is soft. It is of rare occurrence in England, having been found only at St. Michael's Mount; but it is more plentiful in Saxony, Bavaria, and the Tyrol. Before the blowpipe it is infusible.

Bucholzite is a mineral very lately analyzed, and its name is conferred upon it in honour of Buckolz, a celebrated chemist. It is but imperfectly known, the colour being a light brown, spotted sometimes with white, at other times with black. It was analyzed by Dr. Brandes, who gives the following constituent parts: silex, 46; alumina, 50; potash, 1·5; and oxide of iron, 2·5. It was first observed in the Tyrol, by Dr. Brandes.

Potass-Aluminite contains *lepidolite*, *nacrite*, *lepidolite* (*lepidolith*, Brong. and Leonh.).—The name is of Greek origin, signifying a scaly stone. It is of a light flesh-red colour, occasionally grey, and sometimes purple. It is composed of a number of scales, having a semi-metallic lustre, and it is generally hard. In some, though not in every variety, lithia has been detected; but in general the characteristic ingredients are silica, alumina, and potash: of the latter of these, there is about 9 per cent., which divides it from the preceding class. In addition to these, there is also a trace of fluoric acid, manganese, and water. In primitive countries it is most abundant, occurring at Kra-

disko, in Moravia, in granite, and at Limoges in a vein of quartz; it also occurs in North America, and in Scotland.

Nacrite (*erdiger talk*, Leonh.; *talc granuleux*, Haüy; *scaly talc*, Phillips).—It occurs massive, in small scales, closely connected together, and with a slight pearly lustre. Its colour is green or greenish-white, and by this it is easily distinguished from lepidolite. It contains 17 per cent. of potash, with a small proportion of muriatic acid. It occurs at Freyberg in Saxony, and in Moravia and Bohemia.

Hydro-Potass-Aluminite (contains *Haüyne*, *Gieseckite*, *felspar*, *scapolite*); *Haüyne* (*Haüyn*, Karsten; *latialite*, Haüy).—It is of a pale blue colour, passing into grey. Its most frequent form is granular; and when crystallized, its figure is a rhombic dodecahedron. Its composition is—silex, 30; alumina, 15; sulphate of lime, 20; lime, 5; potash, 11; oxide of iron, 1; water, 18. It occurs in the Basalt of Andernach, and at Albano in Italy.

Gieseckite is so named in honour of Sir C. Giesecké. It occurs crystallized in six-sided prisms, of a brown colour. Hitherto it has only been found at Akulliarasiarsuk in Greenland, whence it was brought by Sir C. Giesecké. (*Vide* Phillips, p. 113.)

Felspar (*feldspath*, Leonh.; *feldspath*, Haüy) constitutes a class of minerals agreeing in a great many points with one another. Their chemical composition is always the same, and they all occur both massive and crystallized.

1. *Adularia* (*adular*, Leonh.; *feldspath nacré*, Brong.) is of a white colour, passing into greenish-white. The crystals are four-sided, surmounted by a pyramid of the same number of sides. When polished, it is very splendent, and reflects light, from which circumstance it has received the name of "moonstone." The analysis of Vauquelin gave the following result: silex, 64; alumina, 20; lime, 2; potash, 9; water, 5. It occurs in veins traversing granitic rocks, with quartz, and sometimes amianthus. It occurs at Snowden in North Wales, and in the granite of Arran. The finest specimens are, however, obtained from Mount St. Gothard, which are of very considerable size.

2. *Common felspar* (*gemeiner felspath*, Leonh.) varies in colour from white to red, and into various shades of grey and green. It is generally opaque, at other times slightly translucent, and it occurs massive, and crystallized in the form of an oblique four-sided prism, bevelled on both extremities. It contains only a slight portion of water, scarcely 5 per cent. It is a very abundant mineral, being a constituent part of granite and gneiss, and also forming in itself large and massive rocks. It also occurs in the form of veins traversing primitive mountains, and, combined with hornblende, it forms syenite. It is the fundamental constituent of many varieties of porphyry. The localities are too

numerous, and indeed are too well known to require any enumeration, but the most beautiful crystals occur in the Alps, Siberia, and at Carlsbad in Bohemia.

3. *Labrador felspar* (*Labradorische feldspath*, Leonh.; *feldspath opalin*, Brong.).—Its colour is generally grey, but when exposed in certain directions to the light, it displays a variety of colours. It never occurs crystallized, and its specific gravity is 2·692, according to Brisson. It was first brought from the Island of St. Paul, on the coast of Labrador, but it is now found at Laurwig, and Ingerrmannland in Sweden, and in West Greenland.

4. *Icespar* occurs both massive and crystallized, in long six-sided tables. It is of a greyish-white colour, inclining to yellowish; it is but imperfectly known, though from general characters it belongs to the felspathic class. It is very frangible. Its only locality is Monte Somma, near Naples.

5. *Scapolite* (*scapolith*, Werner; also *arctizit*) occurs massive, either radiated, foliated, or compact, and crystallized in the form of an eight-sided prism. Its colour is red, of rather a pearly lustre, though sometimes dull. It occurs in the Saxon Erzgebirge, and at Arendahl in Norway, as well as in Sweden and Greenland.

6. *Elaolite* (*zeffstein*, Werner; *elaolitf*, Klaproth).—It occurs massive, of a blue colour, generally more or less approaching to green; it also occurs of a red colour. From the analysis of Klaproth, it is ascertained to be constituted of—silica, 46; alumina, 30; potash, 18; water, 2; and also a slight admixture of iron and lime, together amounting to 2 per cent. It occurs at Laurwig in Norway, and also at Stavern in the same kingdom. The average specific gravity of this class is 2·623.

CALC-SILICA-ALUMINITE contains *meoinite, sommite, chiastolite, sadalite, talc.*

Meoinite (*méoinite*, Haüy) occurs in eight-sided prisms, terminated by tetrahedral pyramids, of a whitish colour, and shining lustre. It contains about ·21 per cent. of lime. It occurs at Monte Somma, and also near Rome.

Sommite (*nephaline*, Haüy) occurs in grains or in small hexahedral prisms, of a greenish-grey colour, and vitreous lustre. When immersed in nitrous acid, it gradually becomes cloudy internally, whence its name "nephaline." It occurs at Monte Somma, and also in the lava of the Cape di Bove, near Rome.

Chiastolite (*chiastolith*, Leonh.) is of a greyish-white colour on the exterior, but black internally. It occurs in rectangular prisms, and also enters into the composition of the chiastolite slate. Its principal localities are at Wolfscrag, near Keswick, and also in the county of Wicklow. On the continent it occurs in Galicia in Spain, and in the High Pyrenees.

Sadalite (*sadalith*, Leonh.) is of a light-green colour, massive,

and crystallized in rhombic dodecahedrons. It is slightly translucent, and yields with difficulty to the knife. It is a rare mineral, having only been found in Greenland and Vesuvius.

Talc (*talc*, Leonh.; *talc*, Brong.) occurs massive, indurated, and in hexagonal crystals. It is composed of a number of plates connected more closely together than mica, and is consequently harder than that mineral. Talc generally occurs of a white colour, passing into yellowish or greenish, and is translucent. It contains but little lime. It is found at Glentilt in Scotland, and at Lizard Point in Cornwall, at Zillerthal in the Tyrol, and also at Salzburg. It was used in former times for polishing gypsum figures, and when pounded, the Persians use it for their houses.

Corundum (*corund*, Leonh.; *corindin*, Haüy) occurs of a greyish, greenish, or red colour, generally translucent, but sometimes opaque and even transparent. It occurs crystallized in hexahedral prisms, and it also occurs granular and compact. It is plentiful in primitive rocks in India and China, and it has been found in Piedmont.

Ruby (*rubin*, Leonh.) derives its name from the Latin *ruber*, signifying red, which is its colour. It occurs crystallized in hexahedral prisms, and also in grains, in Ceylon and Pegu. In Europe it is found near Bilin in Bohemia, and at Expailly in France. It is also found at Mount St. Gothard. As a gem, it is highly prized on account of the extreme and rich depth of its colour, and its chatoyant lustre.

Sapphire (*sapphir*, Leonh.; *corindin télésie*, Brong.) occurs principally of a blue colour, passing into a green. It occurs in blunt-edged pieces and in grains, also crystallized in the form of an equiangular six-sided pyramid, with modifications, of which the primitive form is an acute rhomboid. It possesses the property of double refraction, and its specific gravity is 4·320. It occurs in Bohemia, Saxony, France, and Portugal, and in Ceylon and Persia.

Emery (*schmiergel*, Werner; *éméril*, Brong.) occurs of a blackish colour, massive, and of a fine-grained appearance. It is principally found in the East Indies, and it also occurs near Smyrna, in Saxony, and in Guernsey. It is used with water to polish minerals, and with oil to polish metals.

Automalite (*authomolit*, Werner; *spinelle zincifère*, Haüy) is of a dark green colour, and occurs crystallized in the form of an octahedron, and sometimes of a tetrahedron. It occurs in slate at Fahlun in Sweden.

Ceylanite (*ceylanit*, Werner; *spinelle pléonast*, Brong.) occurs of a green colour approaching black, in grains, and crystallized in the form of an octahedron. It occurs at Ceylon, in the sand of rivers near Monte Somma, and in the trap rocks of Andernach on the Rhine.

Salamstone (*salamstein*, Werner; *corindin hyalin*, Haüy) occurs

of a reddish colour, passing on the one hand into a bright red, on the other into brownish and bluish red. It occurs in grains, and crystallized in hexahedral prisms. It is translucent, and occurs only in Hindoostan. The name is the one by which it is known in the Indian peninsula.

FERRO-POTASS-ALUMINITE (*Schorl, killinite, rubellane, mellinite, spinellane, natrolite*).

Schorl (*gemeiner schorl*, Leonh.; *tourmaline opaque*, Haüy) occurs disseminated and crystallized in prisms deeply striated longitudinally. It is of a brownish-black colour, opaque, and shining, and passes into dark green. In composition the silica and alumina are generally nearly the same, both averaging about 34 per cent. Its name is derived from the circumstance of its being found at Shorland in Saxony; but it also occurs in Cornwall, Argyleshire, Perthshire, Bohemia, Hungary, and Spain, principally in granitic, and always in primitic rocks. It occurs in beds, on which account it is easily distinguishable from tourmaline.

Killinite is found of a light green colour, occurring massive, and coated by a ferruginous covering, which yields an argillaceous odour when breathed upon. The characteristic constituents are alumina, potash, and iron, but the composition of this mineral is principally silicious. It occurs at Killiney in Ireland, whence its name.

Rubellane (*rubellite*, Phillips; *tourmaline rubellite*, Brong.) occurs of a brownish-red or red colour, passing into pink. It occurs crystallized in indistinct and aggregated masses, on which account it differs from red tourmaline. It occurs in Moravia, at Rozena, and also in Siberia. In America it occurs with green tourmaline in Massachusetts.

Mellinite occurs of a brownish-green or brownish-red colour, and opaque. It is found crystallized and massive, and is principally brought from Bohemia and Hungary.

Spinellane (*nosin*, Leonh.; *spinellane*, Haüy) occurs in crystalline masses, of a yellowish-blue colour, and of an hexahedral form. It has only been observed on the borders of the Lake of Leach, in felspathic rock.

Natrolite (*natrolith*, Leonh.) occurs of a pinkish or reddish-brown colour, in mammillary masses, presenting a fibrous structure when broken. It occurs in the islands of Mull and Skye, and Rogan on Lake Constance, and at Bilin in Bohemia.

POTASSI-CALC-ALUMINITE (*clinkstone, pitchstone, lava, basalt, pumice*).

Clinkstone (*klengstein*, Leonh.; *pierre sonnante*, Brong.) occurs massive, of a yellowish-grey or greenish colour. Its name is derived from the ringing sound which it gives when struck by a hammer. It occurs in the Isle of Mull, and other parts of Scotland; in Bohemia, the Tyrol, and South America.

Pitchstone (*pechstein*, Leonh.; *petro-silex resinite*, Haüy) occurs of a brown, grey, red, or black colour, massive, and of a slaty structure, possessing a vitreous appearance. It occurs in volcanic districts, associated with lava and pumice, and also in primitive rocks at Freyberg. It occurs in the trap-rocks of Mull and Skye in Scotland, and traverses granite at Newry, in the county of Devon.

Lava bears the same name in both German and French. It is difficult to describe the exact substance, for there are so many varieties, that it must be with caution we should give a decription of it. By lava, we generally understand that substance which is ejected in a liquid state from the craters of volcanoes, though many varieties bear no traces of the action of fire. Many varieties are also micaceous; some contain leuzite, and others have a fused metallic appearance. By these we generally understand "lava." It is of a brownish or greyish-green colour, porous, and brittle. It occurs principally in the neighbourhood of active volcanoes, though in many cases it is likewise found near those which have long since been inergetic. It occurs in beds in Mexico, near the Rio Grande.

Basalt (*basalt*, Leonh.) occurs principally columnar, and also amorphous. It is of a brownish or greyish-black colour, of a granular texture, and opaque. It is very plentifully distributed, occurring in both the old and new worlds. The best examples are, perhaps, the Giant's Causeway, in the county of Antrim, Ireland, and Staffa, on the coast of Scotland. At both these places it occurs columnar, enclosing needle zeolite and mesotype.

Pumice (*bimmstein*, Leonh.) occurs of a greyish-brown colour, tinged with red, very porous, and light enough to swim on water. It occurs principally at the Lipari Islands, and but sparingly in the neighbourhoods of Vesuvius and Etna.

HYDR.-ALUMINITE is by no means an important class of mineral bodies, as it includes the single mineral known by the name of "Wavellite" (*wavelit*, Leonh. and Brong.; *hydr.-argyllyte*, Sir Humphrey Davy).—It occurs botryoidal and globular, the internal structure being radiated. It also occurs crystallized, the most common form being a rhombic prism. Its colour varies from greyish to greenish, or brownish-white, semi-transparent, and externally shining. Its specific gravity is 2·270. When heated in mineral acids, it effervesces, leaving very little residue. Its principal component parts are alumina 71·50, and water, 28·0, though in other specimens traces of iron, lime, silica, and fluoric acid have been detected. It was discovered by Dr. Wavell, near Barnstaple, and since then it has also been found in Cornwall, and in Greenland, and Hualgayoc in South America. It occurs in a stalactitic form in Brazil.

7. CALCITE comprehends a useful, ornamental, and greatly diversified class of minerals, many of them highly esteemed.

When pure, the earth is of a white colour; but in this state it can only be obtained by chemical operations. Its specific gravity is 2·3. Berzelius examined this earth, and found that it was composed of 28 per cent. of oxygen and 72 calcium; this latter is the metallic basis of chalk, but has not been observed accurately, as it burns with great ardour when exposed to light. It was discovered by Sir Humphrey Davy, who gave it the name "Calcium."

Chalk (*kreide*, Leonh.; *chaux*, Brong.) approaches nearest to the chemical element, though it differs but little from the carboni-calcite or carbonate of lime. It is of a white or yellowish-white colour, and occurs massive, adhering to the tongue, and earthy in fracture. It is opaque, with a specific gravity of 2·3. It is one of the most recent secondary rocks, forming large tracts of country, easily distinguished by their smooth appearance. There are at least two layers of chalk, the uppermost containing, in all its situations, horizontal beds of flint, the latter generally abundant in marine productions; but organic remains are found in all the beds. There are a number of fossils characteristic of the chalk occurring in all the European cretaceous beds, but of the fossils of the American chalk only two have been identified with those of Europe. Annexed is a list of the fossils of the cretaceous system from Phillips's Encyclopædia Britannica, Supplement, p. 157.

Polyparia	146	Varieties.
Radiara	85	
Conchif. Plagrin	87	
——— Mesom	122	
——— Rudista	23	
——— Brach	67	
Gasteropoda	56	
Cephalopoda	107	
Crustacea	11	
Annulosa	30	
Cirropeda	2	

The countries in which chalk is principally found are Poland, France, and England. It also occurs in America and Egypt. It is much used in a variety of ways. In Western Norfolk it is used as a building material; when burnt, it forms lime, which is used for mortar and whiting; it is also used for polishing and for manure.

CARBONI-CALCITE includes all those minerals known by the name of "carbonate of lime" (*kalkspath*, Leonh.; *chaux carbonatée*, Bour.; *spath calcatre*, Brong.).—The most perfect form of the carboni-calcite is the "double refracting spar." In this state it is nearly pure carbonate of lime. The crystallized form of this spar is the rhomboid, and the colour is white or yellowish-

white. It is principally brought from Iceland, whence its name "Iceland spar." Calcareous spar is not so hard as fluor, on which account it is easily distinguishable from that mineral. Carbonate of lime also occurs crystallized in a variety of forms, upwards of 500 different crystallizations having been observed, and most of them figured in the "Traité de la Minéralogie par le Comte de Bournon." The most common variety is the dog's-tooth spar, which occurs very beautifully aggregated at Clifton, in the calcareous rocks on which that town stands. The primary form is the obtuse rhomboid, and the varieties are generally modifications of this figure (Bournon has described fifty-six modifications of this figure, which has greatly been added to by other mineralogists). When laminated, it passes into *schiefer spar* (*schiefer spath*, Leonh.; *chaux carbonatée nacrée*, Haüy). Its colour is white, passing into reddish or green. It occurs in Saxony, in Cornwall, in Dauphiné, and in Perthshire in Scotland.

Satin spar (*chaux carbonatée fibreuse*, Haüy) is so named from its satin-like appearance. It occurs of a whitish-grey colour, at Alston Moor, and is much used on account of the high polish it takes for ornamental purposes.

Agaric mineral (*rock milk*, Jamieson) is a rare and beautiful mineral, of a pure white colour, meagre to the touch, earthy, and very light, so much so that it will float for some time on water. It effervesces violently in acids, leaving but a little sediment. It occurs in the crevices of calcareous rocks in Switzerland and in England; it occurs at Sunderland, and near Chipping Norton in Oxfordshire.

Stalactitic limestone occurs mammillated, forming long pendulous masses. The colour varies, though in general it is yellowish-white. The principal localities are—the Woodman's Cave in the Harz mountains, Auxelle in France, in Derbyshire, and in the grotto of Antiparos.

Common limestone (*dichter kalkstein*, Leonh.; *chaux carbonatée compacte*, Haüy; *secondary limestone*, Phillips) is of a granular appearance, approaching earthy. It occurs of a variety of colours, generally, however, of shades of brown, red, and black. It is a rock of much importance, and spreads into considerable districts, in which veins of metal occur, generally of sulphuret of mercury, lead, and zinc. Several limestones are very fine-grained, and bear a high polish, on which account they are much valued as marbles. The beautiful white variety from Carrara is the most valuable, and is much used in sculpture. The varieties are exceedingly numerous, and derive their names either from their locality or their appearance.

Oolite (*roogenstein*, Werner; *roestone*, Jamieson) is another variety of limestone, found massive, and in large beds; it increases its hardness upon exposure. It is common in many

parts of England, particularly near Bath, and on the continent it is also found. It abounds in fossils. Its name is derived from the small granular texture it possesses.

Peastone (*erbsenstein*, Leonh.; *chaux carbonatée concrétionée globuli-forme testacée*, Haüy) has also received the appellation of "pisolite." It is generally of a white colour, approaching somewhat to brown, and the grains vary in size. It is brittle and soft. It occurs at Carlsbad in Bohemia, where it is formed by the rotatory motion of the water rising from the cretaceous bed, and the same reason is perceptible in the water of the baths of St. Philip's, in Tuscany.

Madreporite (*lucullite*, Jamieson; *madreporite*, Brong.) occurs in roundish masses, indistinctly lamellar, and somewhat curved. It is opaque and of a greyish colour. It occurs at Stavern in Norway, at Salzburg, and in Greenland.

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When substances are exposed to the action of water containing particles of cretaceous matter in solution, they become coated in a longer or shorter space of time with a covering of cretaceous matter, white in appearance, except when iron enters into the composition, when they assume a reddish-brown colour. The time which is required for the completion of the process varies according to the nature of the spring which contains the chalk. That of Carlsbad requires a week to form a slight covering, whilst that of Tivoli performs the same in two days. Through the kindness of Professor Leonhard, we have been favoured with the sight of some entire bunches of grapes which had been exposed to the action of the waters of the latter place, the globular form being perfectly preserved; on breaking one of the globules, however, there was merely a hollow, in which was a shrivelled remnant of the grape, proving thereby that the process must have taken place rapidly. We have likewise seen specimens of Tufa (this is the name given to the *petrefactions*) (*versteinerungen*), in which the moss still remains green.

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Another process, equally interesting, is that of the formation of the *calc sinter* (*kalk sinter*, Leonh.); the best example of which may be said to be in a Roman arched drain near Cologne. The deposit is striated, not always horizontally, but sometimes also curved, and of yellow and brown colour. The bottom of the drain is covered with a coating of this horizontal calc sinter, and towards the surface it is more curved, proving that the water was agitated at the time of the deposition of the uppermost layers. This marble receives a high polish, and is employed for the altarpieces of many churches in Germany. These three different processes, by which minerals are continually being formed, cannot fail to be interesting, as they show that minor changes are continually going on imperceptibly.

STRONTI-CALCITE contains *arragonite* (*arragonite*, Haüy; *arragonit*, Leonh.).—It occurs massive, radiated, and crystallized in the form of a six-sided prism, with the lateral facets marked by a longitudinal crevice. The crystals are transparent, and of a yellowish or whitish colour. It derives its name from its having first been observed at Arragon in Spain; it also occurs at the Dufton lead-mines, near Ilfracombe, in Durham, at Salzburg, and at Marienberg in Saxony. According to the analysis of the Rev. J. Holme, it consists of carbonic acid, lime, and water; but from another analysis it is constituted of lime 94·5, carbonate of strontian 3·9, iron 0·7, water 0·3 (Stromeyer's analysis of a specimen from Arragon).

MAGNESI-CALCITE contains *bitter spar*, *pearl spar*, *brown spar*, and *dolomite*.

Bitter spar (*bitter spath*, Leonh.; *chaux carbonatée magnésifère primitive*, Haüy) is commonly found crystallized in the form of an obtuse rhomboid. The colour is greenish-grey or yellow. It is distinguishable from calcareous spar only by analysis, which proves its composition to be—carbonate of lime, 68; magnesia, 25·50; alumina, 2; iron, 1; and water, 2. It occurs at Loch Lomond in Scotland, and also in the Isle of Man. It is also found in Sweden, the Tyrol, and North America.

Pearl spar (*spathiger braunkalk*, Leonh.; *chaux carbonatée ferro-magnésifère*, Haüy) is classed by Jamieson under the name of brown spar, from which, however, it differs materially in colour. Pearl spar occurs massive and crystallized in obtuse rhomboids, with a pearly lustre, and of a white or yellow colour. In addition to the characteristic ingredients, it contains a large proportion of carbonic acid, and a trace of iron and manganese. It is soluble with slight effervescence in muriatic acid. Its localities are in Derbyshire, Devonshire, and Cornwall, and with sulphuret of zinc in Durham.

Brown spar has been described by Phillips as a carbonate of iron, from which, however, it is easily distinguished by its composition. It occurs in the same form, and under the same circumstances as the preceding mineral, but it is not so abundant. It is of a reddish-brown colour, with a slight pearly lustre; like the preceding variety also, it effervesces slightly in acids. Its composition is as follows: lime, 43; magnesia, 10; iron, 8; manganese, 3; and water, 26. It accompanies calcareous spar, heavy spar, fluor, galena, iron pyrites, and silver; and it is principally found in Cumberland and Derbyshire, and on the continent in Norway, Sweden, France, Saxony, and Hungary.

Dolomite (*dolomit*, Leonh.; *chaux carbonatée magnésifère*, Haüy) occurs of a whitish colour, both massive, granular, flexible, and columnar. It is soft, yielding to the nail. Its composition is—40 carbonate of magnesia, and 59 carbonate of lime. It is found in France, Saxony, Sweden, and Spain. Its

name was given in honour of Dolomieu. It resembles granular limestone, but it effervesces very feebly in acids, which distinguishes it.

Magnesian limestone (*brown dolomite*, Tennant) is of a yellowish colour, and occurs massive, with a granular texture. It is composed of lime, magnesia, and a large per-centage of carbonic acid. In the north of England it occurs in beds of considerable thickness, and it likewise occurs in Durham, Northumberland, and Derbyshire.

PHOSPHORI-CALCITE contains the mineral known by the name of *apatite* (*apatit*, Leonh.; *chaux phosphatée*, Haüy), which occurs crystallized in six-sided prisms, terminated by a six-sided pyramid. It is of a white, yellow, green, or red colour, sometimes all occurring in the same crystal. It is composed of—lime, 54·28; phosphoric acid, 45·72. It occurs in the granite of St. Michael's Mount, and also near St. Agnes in Cornwall. It likewise occurs in Bohemia and Saxony, with tin.

Phosphorite (*phosphorit*, Leonh.) is the name given to the massive variety of this mineral.

FLUORI-CALCITE includes a very important, though simple class of minerals, from which the powerful acid called "fluorine," which has such an affinity for silex, and consequently for glass, is obtained. It occurs massive and crystallized in a variety of forms, of which the primitive and most common is the cube. The crystallizations being important, I will give a list:—

1. The cube.
2. The cube truncated on all the edges.
3. The cube with truncated angles.
4. The rhomboidal dodecahedron.
5. The octohedron.
6. The octohedron with the solid angles replaced by square planes.

The octohedron is, however, a very rare form of this mineral. The colour of it is also various, as it occurs both blue, green, purple, yellow, white, brown, and rarely, however, light red, approaching lilac. The specimens of the cube fluor, truncated both on the sides and angles, are rare, more particularly the former, which gives the specimen the appearance of being marked round the squares of the cube with a white line. The crystals of all the varieties are generally aggregated, and the specific gravity is 3·0943, according to Haüy. Before the blowpipe it melts into a white glass, losing all its colour. If sulphuric acid is added to the fluor spar, when pounded and heated, a very penetrating and offensive vapour is produced, which bears the name of "fluorine," the properties of which I have already mentioned. It forms large beds in some countries, and in others it occurs in veins, aggregated with carbonate of lime, spathose iron, quartz, and blende. It is very plentiful in Dur am, tra-

versing veins of sulphuret of lead. It likewise occurs in Derbyshire, and associated with tin and copper in Cornwall, but it is rare in Scotland. On the continent it is abundant, in Saxony, the Harz mountains, Norway, and sometimes in Italy, and it is common in America. Its name is derived from the mineral being used, when pounded, as a flux for metals; and it is employed in Derbyshire for the manufacture of ornamental vases, &c. Its resemblance with calcareous spar, though deceiving in some cases, is easily detected, for it does not effervesce, as calcareous spar, in acids.

SULPHURI-CALCITE includes *anhydrite*, *vulpinite*, and *gypsum*.

Anhydrite (*vulpinit*, Leonh.) occurs massive, crystallized, granular, and fibrous, of a whitish, greyish, or bluish colour. It occurs at Hallein, the Tyrol, and in Carinthia and Austria. Its composition is—lime 40, and sulphuric acid 60, though in some varieties a trace of muriate of soda has been detected, when it is called *muriacite* (*cube spar*, Jamieson; *wurfelspath*, Leonh.).

Vulpinite (*siliciferous anhydrous gypsum*, Phillips) is found in laminated concretions, of a whitish colour. Its composition is—sulphate of lime 92, and silex 8. It occurs at Vulpino in Italy.

Gypsum (*gyps*, Leonh.; *chaux sulphatée*, Haüy) occurs fibrous, compact, and earthy. It occurs of a whitish or reddish colour, and sometimes yellow. It is slightly translucent. It occurs principally in the chalk formation of Paris, and it likewise occurs in Switzerland and Bavaria. In England it occurs in Derbyshire, Devonshire, and Yorkshire.

There is also a crystallized variety which bears the name of *selenite* (*chaux sulphatée crystallizée*, Haüy). The form is an oblique parallelopiped. The colour is the same as that of gypsum. It occurs at Alston in Cumberland, and in Oxfordshire. It is also found in the London clay, and in Bohemia and Siberia.

NITRO-CALCITE includes *nitrate of lime* and *dathalite*.

Nitrate of lime (*chaux nitratée*, Haüy) occurs efflorescing, and sometimes pulverulent. It is soluble in water, and is found on old walls and calcareous rocks, and it is very bitter. Its composition is lime 32, nitric acid 57·44, and water 10·56.

Intermediate between this and the next class stands the mineral known by the name *dathalite* (*datholit*, Leonh.; *chaux boratée silicieuse*, Haüy), which occurs of a greenish or greyish colour, and is slightly translucent. It occurs massive and crystallized, in the form of a rhombic prism, with the edges and angles replaced by planes. It contains, as well as nitric acid, a portion of boracic acid. It has been found at Arendahl in Norway.

BORA-MAGNESI CALCITE contains the mineral known by the name of *boracite* (*borazit*, Leonh.; *magnésie boratée*, Haüy).—It occurs crystallized, in the form of a cube, with the edges re-

placed, and the diagonally-opposed solid angles differently modified. It is of a whitish or greenish colour, and is composed of lime, boracic acid, and magnesia. It occurs at Kalkberg in Brunswick, and also in Holstein.

Barytes, the characteristic earth of the next class, is of a white colour, with a caustic taste. It consists of 90 per cent. of a metallic base termed "barium," and 10 of oxygen. It has never been found pure, but always in combination with either carbonic or sulphuric acid, forming minerals, which can easily be detected by their great weight. Barytes is a violent poison.

Carboni-Baryte is the name given to those minerals in which barytes is combined with carbonic acid. It includes only one mineral, known by the name of *witherite* (*witherit*, Leonh.; *baryte carbonatée*, Haüy).—It occurs massive, crystallized in the form of an hexahedral prism, terminated by six-sided pyramids, and also stalactitic. It is of a whitish, greenish, or yellowish colour, slightly translucent at times, but more frequently opaque. From analyses of specimens from Styria, its composition is, barytes 78, and carbonic acid 22. It was discovered by Dr. Withering, after whom it was named, in Lancashire; and it also occurs in Shropshire, near St. Asaph in Flintshire, and Styria and Salzburg.

Sulphuri-Baryte is barytes in combination with sulphuric acid, and from its weight this class has received the name of *heavy spar* (*schiver spath*, Leonh.; *baryte sulphatée crystallisée*, Haüy).—It occurs both massive and crystallized. The primary form is a right prism, with rhombic bases. Its constituent parts are barytes 67, and sulphuric acid 33. The principal localities where this mineral is obtained are in Cornwall, at Alston Moor, and near Babbicombe Bay in Devon. It occurs at Schriesheim, near Heidelberg. When fibrous, it is called "Bolognian stone," from its occurring near Bologne. By German mineralogists it is termed "Bologneser spath."

Strontian, the characteristic earth of the next class, occurs white. It is composed of 16 per cent. of oxygen, and 84 of strontian—a metal which was first noticed by Sir Humphrey Davy.

Carboni-Strontite includes the mineral known by the name of *strontianite* (*strontian*, Leonh.; *strontian carbonatée*, Haüy).—It occurs massive and crystallized, of which the primitive form is the right rhombic prism. It is composed of strontian 70, and carbonic acid 30. Its name is derived from the place where it was first observed, namely, at Strontian in Scotland; it also occurs in Saxony.

Sulphuri-strontite is the chemical name for *celestine* (*celestin*, Leonh.; *strontian sulphatée*, Haüy).—It occurs of a white or yellowish-white colour. The primitive form of the crystal is the same as the preceding variety. It also occurs stellated. Its

localities are the south-westerly portion of England, more particularly Devonshire and Somersetshire. It also occurs in Yorkshire and Westmoreland, and on the continent at Montmartre. It likewise occurs with sulphur in Sicily.

There now remain but a few of the earthy minerals, which from their composition cannot be classed under any particular head. These are the alkaline minerals, one or two of which are but imperfectly known, and which consequently cannot have any place assigned to them in the chemical classification.

ALUMINO-POTASSITE (*alum*, Phillips; *alaun*, Leonh.; *alumine sulphatée alkaline*, Haüy) occurs principally as an efflorescence on argillaceous minerals. It occurs in slate, and forms stalactites, of a whitish or pinkish-white colour. Its composition is, sulphuric acid 76, alumina 12, and potash 3. It occurs in England near Whitby, and also in Scotland; and it is likewise found in Norway, Bohemia, and Hungary.

NITRA-POTASSITE (*nitre*, Phillips; *naturlischer salpeter*, Leonh.; *potasse nitratée*, Haüy) occurs in crusts of a whitish or yellowish-white colour. It occurs on old walls, or chalk, situated in damp places. It can also be produced artificially by exposing animal refuse to the action of the atmosphere, by which means azote is disengaged and combines with the oxygen, forming nitric acid; and this again combines with the potass in the vegetable matter, and forms nitre. It is the principal constituent part of gunpowder, the sulphur being employed on account of the facility with which it burns, and the charcoal on account of its readily igniting, for the principal object in the manufacture which has to be observed, is so to surround the nitre with inflammable substances that it may readily take light, and disengage the greatest possible quantity of gas in as short a time as possible.

CARBO-SADALITE (*natron*, Phillips; *mineral alkali*, Leonh.; *soude carbonatée*, Haüy) occurs massive, radiated, efflorescing, and in the form of crusts. It is of a grey or yellowish-white colour, and it has a very saline taste. It occurs in the waters of some hot springs, more particularly in that of Carlsbad, and also in lakes which are dried up in summer, in Hungary and Egypt. The natron appears efflorescing on the soil, and when gathered, re-appears in a few days. It is almost always combined with *sulphuri-sadalite* (*sulphate of soda, or glauber salt*), which resembles it in colour and general appearance.

BORO-SADALITE (*borax*, Phillips; *soude boratée*, Haüy) occurs in prismatic crystals, of a translucent white, blue, or green colour. It occurs principally in Thibet, and in its rough state is called "tincal."

MURIO-SADALITE (*common salt*, Phillips; *gemeiner steinsalz*, Leonh.) occurs in beds, and also crystallized in the form of a

cube. It has a shining lustre, and when pure is perfectly white and transparent; but when combined with clay it becomes brown, grey, red, blue, and green. It is a very abundant mineral, occurring in large beds, and in the waters of springs and lakes. It is an ingredient in the waters of the ocean. It occurs principally at Northwich in Cheshire, Droitwich in Worcestershire, and on the continent in Savoy, Germany, Spain, and Russia.

Salammoniac, or muriate of ammonia, is by no means a plentiful mineral. It occurs principally in crusts, though likewise in crystals. Its colour is grey, green, or brownish-black. It is insoluble in water, and may be reckoned among the productions of recent volcanic regions. It also occurs in Tuscany, Germany, and Persia, and it is said to occur in the northern coal-field of England. It has not been carefully analyzed, but it is composed principally of ammonia and soda.

Pollyhallite generally occurs fibrous, of a brick-red colour, seldomer compact, of a transparent white. It is difficultly fusible before the blowpipe, but tinges borax brown. It has not been analyzed with accuracy. It occurs at Ansen, in Steyermark with rock salt, and also in Upper Austria.

Class II.—METALS.

By *native metals* we understand all those metallic bodies which occur pure in their native state, though there are but few of them; the rest are denominated according to their composition, either *sulphurets* (when sulphur enters into combination with the native metal), *oxides* (when the metal combines with oxygen), or *arseniates* (when combined with arsenic), and so forth. The systems of metallic mineralogy have, taken as a whole, been better managed than the earthy minerals, for we find, in a greater or less degree, that they have received a chemical nomenclature, with the exception of a few, which have retained the same appellations from their localities or discoverers.

In this division of the treatise we shall, therefore, endeavour to show the importance which must be attached to the greater number of them, and where space will permit, we shall endeavour to give the method in which they are purified, thus endeavouring to combine simple metallurgy and metallurgical processes with the study of metallic mineralogy.

The order in which they are arranged deviates, perhaps, from many other systems, but their relative value, not in the pecuniary point of view, but in their use or scarcity, has induced us to follow Jamieson's system of order in this case; and at all times the uses of the metals perhaps form the best systematic arrangement.

PLATINA (*platin*, Leonh.; *platin natif ferrifère*, Haüy) is one of the rarest metals, and being the hardest, is consequently used in all cases where extreme nicety is required; and by opticians it is much used in instruments, either mathematical or astronomical, for those parts on which scales of measurement are marked, or which are exposed to great heat. It is of a steel-grey or silver-white colour, occurring in very small grains, which are rarely large, and is nearly as hard as iron, being malleable and ductile, with a specific gravity of 15·601 (Tralles); 17·7 (Wollaston); and, when purified, 23·0. It is infusible except before the oxygen blowpipe, and is soluble in nitro-muriatic acid. Till very lately it was only found in South America, and there only in Brazil, Peru, and Rio del Pinto. Lately, however, it has been found of a much larger size in the Ural mountains, between Russia and Siberia. It occurs only in small quantities, associated in the sand of rivers or alluvial districts with grains of gold, magnetic iron, and zircon. It is much used for crucibles in chemistry, and also for reflecting-mirrors. It is also employed in porcelain painting, in the place of silver, as it does not tarnish so easily as silver, and is of nearly the same colour. In Russia it is coined, the smallest coinage being of the value of 16s. 8d., or thereabout.

PALLADIUM (*palladium*, Wollaston), like the preceding metal, occurs of a silver-white or steel-grey colour, and likewise in small grains, but may easily be distinguished from it by its smaller specific gravity, which is only from 11·0 to 12·1; and it is likewise easily detected by its solubility in nitric acid, to which it imparts a deep red colour. It is likewise infusible, except when mixed with sulphur, when it readily melts. It occurs in the same localities as platina, and is perhaps preferable to that metal in the manufacture of delicate instruments, except when required for a very great heat.

IRIDIUM and OSMIUM are always found associated with one another, in small grains of a steel-grey colour. Its specific gravity is 19·1, and when fused with nitre it acquires a dull black colour, but recovers its original lustre and colour by heating with charcoal. It occurs with platina in the alluvial soil of South America, and was first noticed by Wollaston. It is exceedingly rare.

GOLD (*gold*, Leonh.; *or natif*, Brong.) occurs of a bright yellow colour, inclining to brass-yellow and greyish-yellow. It occurs granular, capillary, and crystallized in hexahedrons and octahedrons. It is shining externally, with a metallic lustre, very malleable, and its specific gravity is 17·6 to 19·2. It generally contains a small portion of silver or copper. It occurs in primitive rocks, rarely in sandstone, and also in the alluvial sands of rivers. It has been found in small quantities in various parts of England, Scotland, and Ireland, but there are no mines

in this country which are worked for gold alone. On the continent of Europe the oldest known locality is Pesterana in the Alps, where it occurs minutely disseminated in sulphuret of iron. It is also found at Gardette in France, in Upper Hungary, and in granite at Salzburg, and in Spain. In Asia it occurs in Thrace and Macedonia, in Siberia, Java, Japan, Formosa, Borneo, and Sumatra. In Africa it is principally obtained by washing the sands of rivers in the neighbourhood of Zahara, the Gambia, Senegal, and Niger, and is collected and brought to market in quills. In the New World it occurs principally in Peru and Mexico, in primitive rocks. The principal portion of the Mexican gold is obtained in the province of Oaxaca, and the mines of Rio San Antonio are much famed for their produce. The following are the most remarkable pieces of gold :—From Paraguay, 50 lbs. weight ; La Paz, in Peru, 45 lbs. ditto ; Choco, 25 lbs. ditto. In North Carolina it occurs in granitic rock, and also in the state of Virginia, in quartz. The ancients denominated gold in combination with silver, *electrum*, which, from Klaproth's analysis, averages gold 64, and silver 36 per cent. It occurs in the sand of the Rhine, at Schlangenberg in Siberia, and at Wicklow in Ireland.

SILVER is a metal of much value, on account of the incapability of tarnishing easily, and its rarity. It has been known from the earliest times, and used for ornamental purposes, such as the manufacture of vases, &c., and for the coinage of different countries, for which purpose it was first used by the Greeks. The following are the forms in which it occurs :—

1. *Antimonial silver* (*spiesglanz silber*, Leonh. ; *argent antimonial*, Brong.) occurs of a white metallic colour, disseminated, massive, and crystallized in rectangular four-sided prisms, longitudinally streaked ; its specific gravity is 9·4 (Haüy). It contains 11 per cent. of antimony, though in some specimens 24 per cent. has been detected. Before the blowpipe the antimony is volatilized with its usual odour, and leaves a mass of pure silver. It occurs in the Andreasberg mine in the Harz, in Spain, Suabia, and France.

2. *Molybdic silver* (*molybdaen silber*, Leonh.) is of a steel-grey colour, occurring crystallized in hexahedral prisms, of a metallic appearance. Before the blowpipe it melts into small globules, of a yellow colour, and somewhat tarnished. It occurs at Pilsen, in Hungary.

3. *Sulphuret of silver* (*glanzerz*, Leonh. ; *argent sulphuré*, Brong. ; *silver glance*, Jamieson) occurs of a dull grey colour, of a metallic appearance, which, when exposed to the atmosphere, becomes covered with a steel-coloured tarnish. It occurs massive principally, and sometimes crystallized in the following forms ; viz., the cube, the octahedron, and rhomboidal dodecahedron. When exposed to the action of fire, the sulphur is evaporated,

and a bead of pure silver remains. Its constituent parts are silver and sulphur, the latter entering into its composition in the various proportions of 15, 16, and 25. Its specific gravity is 5·8. It is the most plentiful of the ores of silver, occurring in veins traversing primitive and secondary rocks, but principally in gneiss and granite. It is generally associated with lead and copper, and in combination with gold it forms the metal known by the name of *electrum*. It occurs with lead in the mines of Cornwall and Devonshire. In the Harz mountains, at Schemnitz in Hungary, Joachimsthal in Bohemia, and Schlangenberg in Siberia. It is frequent in Mexico, more particularly in the mines of Guanaxuato, Zacatecas, and Halpujahua. It is extracted from the ore by the process of amalgamation with mercury. The red variety (*rothgültigerz*, Leonh.) is so named on account of its colour.

4. *Bismuthic silver* (*wismuth silberez*, Leonh.) occurs of a lead-grey colour, disseminated and crystallized. It is easily distinguished from sulphuret of silver by the metallic globules which ooze out when exposed to the flame of an oxygen blowpipe. It contains the following proportions of metallic elements: —bismuth 27, lead 33, silver 15, iron 4·30, copper 0·90, and sulphur 16·30. It has only been found in the Black Forest, in a vein traversing gneiss.

5. *Carbonate of silver* (*kohlensaures silber*, Leonh.; *argent carbonaté*, Haüy) occurs of a greyish-black colour, massive, and glistening. It effervesces in nitrous acid. It contains about 12 per cent. of carbonic acid, and 15·5 of antimony, the remainder consisting of silver. It occurs at Altwolfach in the Black Forest, in primitive rock, accompanied by sulphuret of silver and native silver.

6. *Muriate of silver* (*silber hornerz*, Leonh.; *argent muriaté*, Brong.; *hornerz*, Werner) occurs of a greenish, brownish, or reddish-blue colour; massive, investing, and crystallized in cubes, slightly translucent, and sectile. It is fusible in the flame of a candle, and when exposed to the heat of a flame urged on by a blowpipe, it melts into a metallic globule, and emits the same vapours as muriatic acid. It occurs in primitive rocks, in veins in which other ores of silver and lead are found, in Huel Mexico mine in Cornwall, and also in Saxony, the Harz mountains, France, and Siberia. It also occurs in Peru.

MERCURY is the only metal which occurs liquid in its native state, and its ores are by no means numerous. In combination with sulphur, it forms the sulphuret of mercury, and it is also met with in combination with silver and silex. It is thirteen times heavier than water.

Native fluid mercury (*gediegen quicksilber*, Leonh.; *mercure natif*, Brong.) is of a silver-white colour, and occurs in small globules, in the crevices of rocks, particularly in those in which

the sulphuret of mercury is found. It is found at Idria in Saxony, in Bavaria, and in Spain, and is employed for the process of amalgamation, on account of the property it possesses of volatilizing at a lower temperature than red heat.

Sulphuret of mercury (*cinnabar*, Phillips; *zinnober*, Leonh.; *mercure sulphuré*, Haüy) occurs of various shades of red, passing from vermilion to carmine. It occurs most frequently massive, rarely crystallized, in acute rhomboids. According to the analysis of Kalproth, it consists of 84·50 quicksilver, and 14·75 sulphur. It occurs in the sandstone and shale formations, rarely in the clay-slate, and is generally accompanied by the native quicksilver. It occurs in the same localities as the preceding variety. When combined with bitumen, the colour is more dull, and this variety is then known by the name of *bituminous cinnabar*.

Copper is the next metallic element which deserves our attention, as it occurs very plentifully in nature, and enters into the composition of other minerals. In its native state it is tenacious and malleable, and eight times heavier than water. It is a very useful metal, forming several alloys, viz.—

Copper + zinc = brass.
10 copper + 2 tin = bell-metal.
2 copper + 1 tin = speculum.

It occurs principally in primitive countries (many of the Cornish mines are situate in this description of country, while others are found in the argillaceous schistus, commonly called killas).

Copper occurs in the native state (*gediegen kupfer*, Leonh.; *cuivre natif*, Brong.) in a variety of forms, either in rolled pieces, in sheets, dendritic or massive. It is of a copper-red yellow, incrusted in many cases with green. It has been found crystallized in the form of a cube and modifications of the same figure, but they are generally very minute and imperfect. It is flexible, though not elastic, malleable, and difficultly frangible. Specific gravity, 8·4. Native copper is composed almost entirely of copper, generally with a small proportion of gold or iron, and it is the only metal which occurs plentifully in the native state. The rocks which contain veins of this metal are generally primitive; sometimes, however, it is found in the older secondary rocks, as greywacke and granular limestone. It is found in Cornwall, in Norway, and at Fahlun in Sweden; in the Saxon Erzgebirge, Oberstein, Salzburg, and near Lyons in France; near the Coppermine River in North America, and at the foot of the volcano of Zurullo in Mexico. One of the largest masses known weighs 2,600 lbs., and was found in Brazil.

Ferrate of copper (*grey copper*, Phillips; *fahlerz*, Leonh.; *cuivre gris*, Haüy) is of a steel-grey colour. It occurs massive, and crystallized in the form of a tetrahedron. It is composed of

copper 52, iron 23, and sulphur 14. It also occurs with a proportion of arsenic (arsenical ferrate of copper), and antimony (antimonial ferrate of copper), and, rarely, with a small portion of platina. It occurs in the same localities as native copper, and is accompanied by the various ores of copper, but is less frequent in Cornwall than the other varieties.

Sulphuret of copper (*copper pyrites*, Jamieson; *yellow copper*, Jamieson; *kupferkies*, Leonh.; *cuivre pyriteux*, Brong.) occurs of various shades of yellow, crystallized in tetrahedrons, with the solid angles replaced. It also occurs botryoidal and amorphous, and often beautifully variegated. It can easily be distinguished from iron pyrites by its yielding to the knife, which iron pyrites does not. It always contains a large proportion of iron and sulphur; it is separated from the latter by roasting, and the residue is boiled in nitric acid, from which the iron is discharged by the addition of ammonia. It is the most abundant of all the ores of copper, accompanying not only the other ores of the same metal, but likewise those of lead, iron, and nickel. Very fine specimens are obtained from the Tincroft mine in Cornwall. When arsenic enters into the composition (*arsenical sulphuret of copper*), the colour changes into a yellowish-white, which easily tarnishes. Before the blowpipe it emits white arsenical vapours, by which it can be easily distinguished from copper pyrites. It has been found at Huel Gorland, in Cornwall. The greatest proportion of the copper which is manufactured in England is from this ore. The annual produce of the copper-mines of England alone is estimated at 80,000 to 100,000 tons of ore, or about 8,000 tons of pure metal, which averages from 85*l.* to 90*l.* per ton.

Oxide of copper (*red oxide of copper*, Phillips; *rothkupferer*, Leonh.; *cuivre oxidé*, Brong.) occurs of various shades of red. It is transparent or translucent, occurring in octahedral crystals, generally minute, and with a specific gravity of 4·9. It occurs in several of the mines of Cornwall, and the Harz, and also in Norway, Sweden, and South America. The constituent parts are, copper 88, and oxygen 12. Before the blowpipe it is easily reducible to a metallic globule.

Carbonate of copper (*malachit*, Leonh.; *cuivre carbonaté*, Brong.; *malachite*, Phillips) is a very important division of the ores of copper. There are three varieties—the green, blue, and crysocolla. The first occurs of various shades of green, fibrous, and sometimes stellated. Before the blowpipe, upon borax, it is reducible to the metallic state, and gives a green colour to the borax. The average proportion of carbonic acid is 19 per cent. It occurs with all the other varieties of copper, in all their localities; but the finest specimens are from Siberia. It is susceptible of a very high polish, and is used on that account for ornamental purposes.

Crysocolla (*krupfergruen*, Leonh.) is the name given to that

variety which, in addition to the carbonic acid, contains silica and water. It is of a bright green colour, occurring botryoidal, massive, and stalactitic. It accompanies the carbonates, and is found in Bohemia, Siberia, and Cornwall. It occurs also in Mexico.

Hydro-carbonate of copper (*blue carbonate of copper*, Phillips; *kupferlazur*, Leonh.; *azure cuivre*, Brong.) occurs of a dark blue colour, crystallized and botryoidal. It accompanies the green carbonate, and is found in Chili, Bohemia, France, and Saxony. Fine specimens are obtained from Huel Unity mine in Cornwall.

Sulphate of copper (*blue vitriol*, Phillips) is of a blue colour, and occurs massive, stalactitic, and botryoidal. It consists of copper 33, sulphuric acid 30, and water 27. It occurs in Cornwall, and plentifully in the mines of Saxony; it also occurs in Cuba, and in Mexico. Sulphate of copper can be prepared artificially, but then forms into crystals, in which state it is rarely found in nature.

Phosphate of copper (*phosphor kupfer*, Leonh.; *cuivre phosphaté*, Brong.) generally occurs crystallized, of a blackish-green colour, generally translucent. In some cases it occurs of a yellowish-green colour, and crystallized in prisms, which are reducible to an octahedron. From the analysis of Klaproth, in consists of copper 68·13, and phosphoric acid 30·95. It is found near the river Tamar in Cornwall, at Rheinbreitbach, and in Hungary.

Arseniate of copper (*arsenikkies*, Leonh.; *cuivre arseniaté*, Haüy) occurs of a variety of forms, of which we add an enumeration, viz.—

I.	Octahedral ..	bluish-white	translucent.
II.	Rhomboidal ..	green	opaque, except when small.
III.	Trihedral ..	bluish-black	opaque.
IV.	Prismatic ..	brownish or yelllowish-green	translucent.

The two first varieties are not so hard as fluor; the two last, however, are harder. The composition of the varieties differs but little—in general, copper, arsenic acid, and water—the first composing one-half, and the second one-fith per cent., enter into the composition. They are all found in Cornwall, principally in the Huel Unity and Tincroft mines.

* * * * *

The ores of copper can always be distinguished from those of iron, by the blue colour they afford when immersed into liquid ammonia.

A very important class of metallic bodies next comes under our inspection, containing several very interesting combinations and crystallized specimens of metals. As a metal, iron cannot be too highly esteemed, nor its value fully appreciated, as it not only enters into the composition of almost every substance, but it

forms the principal article in the manufactures, and consequently in commerce. England knows how to appreciate its value better than any other nation, for, in the manufacturing districts, the increase of power and the superiority of workmanship are merely the results of the successful application of steam-power to machinery, and these are all of iron. Iron is magnetic, and it acquires this property when it is merely placed in a vertical position for some hours, the northern pole being always at the lower extremity. The ores of iron are numerous, as will hereafter be seen. It is found in combination with oxygen, sulphur, the phosphoric, muriatic, carbonic, and sulphuric acids, silex, alumina, and water, and when pure has a specific gravity of 7·8.

It seems from general accounts and actual remarks, that the different ores of iron belong to different tracts of country, or different formations; as, for example, the oxides and carbonates, or brown iron ores, belong to primitive tracts, the red iron to secondary districts, and those in which alumina enters into the composition, to carboniferous tracts of country, either resting upon the coal or forming layers in the clay-slate between the beds. Iron is very tenacious and malleable, and more ductile than gold and silver. It occurs in nearly a pure state, though this is rarely the case, and it is then reported to have fallen from the atmosphere. In this state it is of a steel-grey colour, and is composed of iron and a small portion of nickel. It is a very rare mineral, occurring generally in the warmer countries, only one instance being known of its being found in England; it is, however, reported to have been found in Ireland. A mass, weighing 3,000 lbs., was formed near the Red River, in Louisiana, and a large mass is preserved as a corner-stone in one of the towns of Northern Mexico. It has been found in several localities in South America and Siberia.

Sulphuret of iron (*schwefelkies*, Leonh.; *iron pyrites*,* Phill.; *fer sulphuré*, Brong.) is the most abundant mineral of the class, being the one from which the iron of commerce is in a great degree extracted; but if not carefully smelted, it is likely to be brittle, and consequently of less value. It occurs in rounded masses, and crystallized in the form of the cube or octahedron, and modifications of them. It likewise occurs as a coating to other substances. Its colour is brass-yellow, sometimes brownish, owing to decomposition, as the sulphur is readily disengaged in a short space of time, particularly in the rounded masses, and the mass then falls to pieces. That from the Alps, which is the matrix of the gold, contains so much sulphur that it destroys the paper upon which it is placed. From the analysis of a specimen from Bognor, it is constituted of iron 45, and sulphur 55; but this varies according to circumstances. It contains fre-

* Pyrites is derived from the Greek, in allusion to its giving sparks when struck.

quently a proportion of arsenic, which causes the colour to be more of a grey, or a portion of gold, then it assumes a deep yellow colour. In this class the gold pyrites of the Alps is placed. It has been conjectured that the rounded masses are of atmospheric origin, on account of their form and the quantity in which they are found. At one time a mass of chalk, which had been thrown out into spoil, after forming an embankment on the London and Birmingham Railway, was found covered the next morning with small masses of sulphuret of iron, agreeing precisely in the description with this class, and which had no doubt fallen during the preceding night. It is also singular that these masses are found in or near the chalk districts only.

Aluminate of iron (*strahlkies*, Leonh.; *fer sulphuré blanc*, Haüy; *white iron pyrites*, Phillips) is of a metallic tin-white colour, sometimes slightly tinged with yellow. It occurs botryoidal, stalactitic, and crystallized. It derives its name from the small proportion of alumina it contains, but which rarely exceeds 3 per cent.; on analyzing a specimen with care, I have detected 3 per cent. of alumina, 48 of iron, 49 sulphur; and the form of the crystal, which deviates but slightly from the varieties of sulphuret of iron, may be attributed to this addition. It occurs plentifully in Cornwall.

Magnetic sulphuret of iron (*magneteisen*, Leonh.; *fer sulphuré ferrifère*, Haüy) occurs massive, and crystallized in six-sided prisms, of which the lateral angles are replaced by planes. It is found of yellowish-white, reddish, or brownish colour, at Moel Elion in Caernarvonshire, in Norway, the Hartz mountains, and Silesia. When pure, it is magnetic. A second variety has received a different appellation (*magnetic iron ore*, Phillips; *magneteisenstein*, Leonh.) on account of the much smaller proportion of iron it contains. It occurs crystallized in octahedrons, which is the primary form, and of a metallic, shining black colour. It also occurs massive (*loadstone*), but not so frequently. It is a plentiful associate of iron pyrites in schistous rock, and is plentiful in primitive rocks. In Cornwall it is associated with other ores of iron, and is frequent in the schistous formation of Mexico.

Oxide of iron (*oxydeisen*, Leonh.) occurs massive, of various shades of red, of an earthy appearance and texture, and yields a somewhat clayey odour when breathed upon. It is constituted of iron and oxygen, in the proportion of 13 of the former, to 38 of the latter. It is found plentifully in Wales, Cornwall, Bohemia, and Siberia, associating the ores of iron and copper, and not less frequently accompanied by quartz.

Oligistic iron (*eisenglanz*, Leonh.; *fer oligiste*, Brong.) differs from the magnetic sulphuret of iron by its not possessing the magnetic power. It occurs lamelliform, and rarely crystallized. It is of a shining iron-black colour, brilliant, and often irride-

scent. It is most plentiful in Elba ; less so in Bohemia, Bavaria, and Saxony, and uncommon in North America. From the analysis of Hassenfratz, it is composed of 69 iron, and 31 oxygen.

Hydrate of iron (*rothereisenstein*, Werner ; *red iron ore*, Phillips) is likewise known by the name of *hematite*, and occurs fibrous, massive, and scaly, of a red colour, varying in intensity. Some varieties occur of a grey colour ; specific gravity 4·7. It is well calculated for the manufacture of iron, and occurs in primitive rocks in Devonshire, Cumberland, Bohemia, Saxony, and Silesia.

Hydrosilicate of iron (*brauneisenstein*, Leonh. ; *fer oxydé*, Haüy ; *brown iron ore*, Phillips) occurs of various shades of brown, and crystallized, also in botryoidal and stalactitic masses. From the analysis of Vauquelin, it has been ascertained to consist of iron 80·25, water 15, silex 3·75, on which account I have named it hydrosilicate of iron. It occurs in secondary rocks, principally in Saxony and Bohemia, also in the Tincroft mine in Cornwall. It affords a very good iron for the steel manufacture, on account of the absence of any acid.

Silicate of iron (*jaspisartiger eisenstein*, Leonh. ; *jaspery iron*, Phillips) occurs of a yellowish or reddish-brown colour, and massive. It occurs at Neustadt, in Austria, in limestone, and in Shropshire. It is very hard.

Carbonate of iron (*spathose iron*, Jamieson and Phillips ; *fer spathique*, Brong. ; *spatheisen*, Leonh.) occurs of various shades of yellow, passing into light brown, with a lamellar structure, and shining. The analysis of a specimen from Cornwall yielded, iron 62, carbonic acid 37, magnesia 1. It differs from brown spar in composition and colour, and from hydrosilicate of iron in composition likewise. It occurs in several of the Cornish mines, but not plentifully ; in the Hartz, and North and South America.

Phosphate of iron (*blue iron ore*, Phillips) occurs of a bluish-green or blue colour, of an earthy appearance, and crystallized in right oblique-angled prisms. It contains about 30 per cent. of water. It occurs with iron pyrites in the neighbourhood of St. Agnes in Cornwall, and in Bohemia. A second variety, which partakes still more of the earthy appearance of the foregoing species, is found in the peat bogs of the different parts of this country ; it is, however, distinguishable on account of its grey colour, which on exposure becomes blue.

Sulphate of iron (*green iron*, Phillips ; *eisenvitriol*, Leonh.) occurs of various shades of green, yellow, and yellowish-green. These latter colours are, however, the result of exposure, the natural colour being a bright emerald-green. It occurs principally massive, but is also found crystallized in right oblique-angled prisms. It is an associate of the different ores of iron,

and occurs with them, and in the coal-mines of northern England. It arises from the gradual decomposition of iron pyrites, which I have mentioned in that article.

Chromate of iron (*chromeisenstein*, Leonh.; *fer chromaté*, Brong.) occurs of a black or yellowish-black colour, rarely yellow. It is found massive and crystallized, in octahedrons; also disseminated. It occurs in serpentine rocks in the United States of America, and also in Cornwall. It is employed as a pigment, and produces a fine yellow colour.

Arseniate of iron (*wurfelerz*, Leonh.; *cube ore*, Jamieson; *fer arseniaté*, Haüy) occurs of various shades of green, reddish-brown, and brownish-yellow. It occurs principally in cubes, seldomer massive, with a vitreous lustre. It is sometimes transparent, though not unfrequently opaque. From analysis, it has been ascertained to consist of iron 48, arsenic acid 18, water of crystallization 32, carbonate of lime 2·50. It becomes electric when exposed to heat. It occurs in the Wheal Unity mines; also in the department of Haute Vienne, in France.

Oxolate of iron (*Humboldtine*) has only recently been discovered; but from all accounts it appears to be of a bright yellow colour, and occurs in indeterminate crystals, with a specific gravity of 1·3. The analysis of Mariano de Rivero determines its composition to be iron 54·56, oxalic acid 46·14. It occurs near Bilin, in Bohemia, and also at Kolowserieu.

Manganese, the metal next in succession, has rarely been reduced to the metallic state, on account of the readiness with which it is decomposed on exposure to the atmosphere. It is employed in the glass manufacture, for producing a violet colour, and is used, when in a state of black oxide, to produce oxygen gas. It is found principally in primitive countries, but is also present in secondary formations. Specific gravity 8.

Silicate of manganese (*siliferous oxyde*, Jamieson; *manganèse oxydé silicifère*, Haüy) occurs of a pale red colour, sometimes yellowish, inclining to black. It occurs massive, rarely crystallized in curvilinear rhomboids. From different analyses, which have yielded nearly the same results, it is determined that its composition is nearly in the following proportions; viz. manganese 49, silex 49, lime 4, magnesia 1·6. It melts into a pale red glass before the blowpipe, without addition. Its specific gravity is 3·2. It occurs near Tavistock in Devonshire, and in Cornwall. On the continent at Laughaushylta in Sweden, in Siberia, and Transylvania.

Oxide of manganese (*grau braunsteinerz*, Werner; *manganèse oxydé*, Brong.) occurs of a steel-grey colour, crystallized in prisms, the primary form of which is a right rhombic prism. It is soft, and very brittle. There is also a compact variety, which bears the name of *wad*, when possessing an earthy appearance. It occurs plentifully in iron-mines, and is likewise found near Cal-

lington in Cornwall, near Bristol, and at Aberdeen. The earthy variety is an ingredient in the peat of the morass, near Capper, in Ireland.

Sulphuret of manganese is of a brownish-black colour, and occurs botryoidal and massive. Its composition is, manganese 82, sulphur 11, and carbonic acid 5. It is found in Cornwall and Transylvania.

Carbonate of manganese (*manganèse oxydé carbonatée*, Haüy) occurs massive, and of a grey colour, more commonly, however, rose-red. It occurs in Bohemia.

Carboni-silicate of manganese (*hornmangan*, Leonh.) is a mineral of which but little is comparatively known. The following is the description of a specimen which some time since was brought under our notice. It occurs massive, in globular efflorescences or druses, varying in size, forming the surface of silicate of manganese and brown iron ore. It is somewhat brittle, and of a dark brownish-grey colour, approaching steel-grey. From analysis, it consists of manganese 54, silex 32, carbonic acid 8·2, and water 3·4. It occurs at Stahlberg, with jaspery iron ore.

Allagite contains the same constituents, and a trace of lime; it occurs in the Harz.

Rhodonite contains a portion of alumina, and the photogite contains a larger per-centage of carbonic acid than the preceding minerals.

ARSENIC rarely occurs in the metallic state in nature, but the metal is of a bluish-white colour, and of a metallic brilliancy. It is a very plentiful constituent in almost every variety of metallic production, and constitutes a class of ores in itself. It occurs in primitive countries, and its specific gravity is 8·31. Its poisonous qualities are well known, and need no further remark. It is plentiful in most primitive rocks, and can always be detected, by the offensive odour which it yields when exposed to heat.

Sulphuret of arsenic (*realgar*, Phillips; *realger*, Leonh.) occurs of a beautiful red (*realgar*) or yellow colour (*orpiment*), both varieties occurring crystallized, massive, disseminated, acicular, and investing; but it is by no means abundant in any one of these forms. The crystals are prismatic, and are either translucent or slightly transparent, becoming electric by rubbing. The results of two analyses by Klaproth are as under :—

	Realgar.	Orpiment.
Arsenic	69·0	62·0
Sulphur	31·0	38·0
	100·0	100·0

The specific gravity of both being 3·3 to 3·4. It occurs in pri-

mitive rocks in the province of Dauphiné in France, in Gallicia and Transylvania, at Andreasberg in the Harz, and in Mexico and China, and generally associated (viz. realgar and orpiment).

Oxide of arsenic (*arsenicbloom*, Jamieson; *arsenikbluethe*, Leonh.; *arsenic oxydé*, Haüy) occurs of a snow-white colour, with a slight tinge of yellow, red, or grey, generally of an earthy appearance, though it likewise occurs capillary and investing. It accompanies the red sulphuret of arsenic at Andreasberg, at Joachimsthale, and in the province of Dauphiné.

Native arsenic (*gediegen arsenik*, Leonh.; *arsenic natif*, Haüy), though so called, differs materially from other native metals, on account of the numerous foreign ingredients it contains, among which may be enumerated, copper, silver, gold, and iron. It is of a greyish-black colour, brilliant when first broken, but when exposed to the air it becomes dull; it occurs massive, botryoidal, and sometimes nearly fibrous. It occurs in the province of Alsace in France, at Konigsberg in Norway, and at numerous other parts of Germany and the American continent.

Bismuth is of a reddish-white colour, very brittle, and easily fusible—(from experiments made by Sir Isaac Newton, an alloy of 8 parts of bismuth, 5 of lead, and 3 of tin, melts in water below the boiling point). It is found pure, and also with sulphur. It is used in several soft solders; specific gravity 9·8.

Gediegen wismuth, Leonh.; *bismuth natif*, Haüy.—It has generally a slight external tarnish, and it occurs principally amorphous, with a lamellar structure. Before the blowpipe it volatilizes in the form of a white vapour, with an arsenical odour. It occurs in primitive districts of country, associated with cobalt, nickel, silver, and lead; at Johangeorgenstadt in Saxony, in France, Transylvania, Norway, and Cornwall.

Sulphuret of bismuth (*wismuthglanz*, Leonh.; *bismuth sulphuré*, Haüy) occurs of a lead-grey colour; crystallized in prisms deeply striated longitudinally, and in small masses. Its specific gravity is 6·1. It occurs at Joachimsthale and Georgenstadt with native bismuth, cobalt, and arsenic. It frequently contains copper (*cupriferous sulphuret of bismuth; vide* Phillips, p. 274), when the metal becomes tarnished of a red colour. The analysis of Klaproth determined the composition to be, bismuth 47·24, copper 34·66, and sulphur 12·58. It likewise occurs in combination with lead (*plumbo-cupriferous sulphuret of bismuth; vide* Phillips, p. 274), of a steel-grey colour, with a yellowish tarnish. The annexed is the analysis of John: bismuth 43·2, lead 24·3, copper 12·1, nickel 1·5, tellurium 1·3, and sulphur 11·5. The only known locality is near Beresof, in Catharinenberg, in Siberia.

Carbonate of bismuth is a rare, and as yet but imperfectly-known mineral. It occurs of a yellowish or whitish colour, somewhat earthy in appearance, but harder than carbonate of lime. It occurs in Cornwall, at St. Agnes and St. Columb.

Antimony is found in primitive and secondary districts, of a silvery-white colour, brittle, and of a specific gravity of 6·5. It is employed in medicine, and in the composition of printing-types.

Native antimony (*gediegenspies-glas*, Leonh.; *antimoine natif*, Brong.) is of a tin-white colour, which becomes tarnished by exposure. It occurs amorphous, with a lamellar structure, easily frangible, and containing 97 per cent. of antimony, and the remainder a mixture of silver and sulphur. It occurs in Dauphiné, in the Harz, and at Sahlberg, in Sweden.

Sulphuret of antimony (*grey antimony*, Phillips; *grau spiesglaserz*, Leonh.; *antimoine sulphuré*, Haüy) occurs of a light metallic grey colour, massive, and crystallized in rhombic prisms, which are laterally aggregated. A fine variety is found on the north coast of Cornwall, near St. Agnes, very compact, and closely radiated. It likewise occurs in Auvergne, the Harz mountains, and in Hungary. A very beautiful variety, from Huel Boys mine, in Cornwall, has received the name of *plumose sulphuret of antimony*, on account of its downy appearance. It occurs investing the surface of other metals and minerals. Another variety is known by the name of *red antimony* (*antimoine oxydé sulphuré*, Haüy); it is slightly translucent, and very brittle, and is composed of antimony 67·5, oxygen 10·8, sulphur 19·7. It occurs, with all the other varieties, at Allemont, in France.

Oxide of antimony (*weiss spies-glaserz*, Leonh.; *antimoine oxydé*, Haüy) occurs of a greyish-white or yellowish-white colour, in tabular crystals, but more commonly massive. It is translucent, soft, and heavy, with a shining lustre. It accompanies the other ores of antimony at all the localities where they are found, and at Malazka, in Hungary, in clay containing sulphuret of antimony.

Earthy oxide of antimony (*antimonial ochre*, Phillips) occurs of various shades of yellow and brown; it occurs investing the ores of antimony, and is brittle and earthy in appearance. It is found in Cornwall with the ores of antimony.

Molybdena has never been found pure, and is difficultly reducible to the metallic state, when it is of a greyish-white colour. It is a rare mineral; its specific gravity is 8·6.

Sulphuret of molybdena (*wasserblei*, Werner; *molybdaen*, Leonh.) is of a bright lead-colour, and it occurs massive, and in flat hexahedral tables, opaque, and slightly flexible. It consists of molybdena 60, and sulphur 40. It is soluble with violent effervescence in carbonate of soda. It occurs in Cornwall, at Calstock, in Huel Unity, and Huel Gorland; also in Westmoreland, and in Glenelg, in Inverness-shire.

Oxide of molybdena (*molybdaenocker*, Leonh.) occurs of various shades of yellow. It is imperfectly known, and, on account of its rarity, has only been described by Berzelius:—" Its charac-

ters resemble those of pure molybdic acid, but, treated with soda, it sinks into the charcoal, leaving a residuum of protoxide of iron on the surface. It occurs with the sulphuret of molybdena at Nummedalen in Norway, and at Loch Creran in Scotland."—(*Vide* Phillips, p. 249.)

TELLURIUM is likewise an exceedingly rare metal, about the colour of tin, nearly as fusible as lead, and with a specific gravity of 6·2.

Native tellurium (*gediegen tellur*, Leonh.; *gediegegen sylvan*, Werner; *teller natif auro ferrifère*, Haüy) is of a tin-white colour, passing into metallic-grey. It occurs in minute crystals, the primary form of which is unknown. Analysis: tellurium 92·55, iron 7·2, gold 0·25. It burns with a green flame, on exposure to a great heat, and is almost entirely volatilized in a white vapour with a pungent acrid odour. It has only been found in Facebay in Transylvania. Another variety, containing the same ingredients, has received the name of *graphic tellurium.* It consists of tellurium 60, gold 30, silver 10. It has only been found at Offenbaya in Transylvana. A third variety, in which lead enters into the composition (*plumbo-auriferous-tellurium, yellow tellurium*, Phillips), is found at Nagyaj in Transylvania, which, on analysis, yielded tellurium 44·75, gold 26·75, lead 19·5, silver 8·5, sulphur 0·5.—*Klaproth.* There is also another variety, which contains above 50 per cent. of lead, duller in colour, whence it is called *black tellurium.* Upon analysis it was ascertained to be composed of tellurium 32·2, lead 54, gold 9, silver 0·5, copper 1·3, sulphur 3. It is likewise found at Nagyaj in Transylvania.

TIN has never been found pure. It is the lightest of the ductile metals, is of a whitish colour, more tenacious than lead, very fusible and elastic.

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Some years since, several pieces of pure tin were found in different localities, which gave rise to an opinion that tin occurs in the native state; but from authenticated sources of information, this erroneous supposition has been dropped, as the places where the specimens were found were the sites of some old smelting-houses.

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Oxide of tin (*zinnstein*, Leonh.; *étain oxydé*, Haüy; *tinstone*, Jamieson) occurs nearly colourless, or of a reddish-brown colour, and in both cases it is nearly transparent. It rarely occurs massive; generally, however, crystallized in the crevices of veins. The primitive form of the crystal is the obtuse octohedron, but the natural crystals are prismatic (the planes of the prism arising from the replacement of the later solid angles of the primary octohedron by six-sided planes). It gives sparks with the steel, and decrepitates strongly before the blowpipe. It belongs exclusively to the oldest primitive rocks, and is found in veins

and beds associated with quartz, mica, steatite, topaz, phosphate of lime, pyrites, &c. It is principally found in Cornwall, where it is worked to advantage, and has been a source of considerable benefit to this country in general for several centuries. It likewise occurs in the Erzgebirge, in different parts of France, in Sumatra, and Greenland. The fibrous variety (*wood tin*) appears to have arisen from the partial destruction of this variety. It occurs in most of the stream-works in Cornwall.

Granular tin is a third variety, found in loose globular masses, sometimes imbedded in the gangue or walls of the vein, and at other times loose in the sand of rivers, in pieces varying in size from a grain to the size of the fist. It is found in Cornwall in this state, also in Chili and Mexico, and is frequently accompanied by grains of gold.

Sulphuret of tin (*tin pyrites*, Phillips; *zinnkies*, Leonh.) occurs of a steel-grey colour, and sometimes also yellowish-white or yellow. It has sometimes been called bell-metal ore, on account of its resemblance in colour to that metal. It consists of 26·5 tin, 30 copper, 12 iron, and 30·5 sulphur. It has only been found in Cornwall, in the parish of St. Agnes.

TUNGSTEN is a hard metal, of a light steel-grey colour, possessing a specific gravity of 17·22. It has not been found in the pure state, but only in the state of an acid combined with iron (*wolfram*), or with lime (*tungsten*). Tungstic acid consists of 80 tungsten, 20 oxygen.—(*Vide* Gmelin's Chemie.)

Oxide of tungsten.—Imperfectly known, and described only in "Silliman's Journal," October, 1821. Colour—orange to chrome-yellow or yellowish-grey. Appearance—massive, with some appearance of regular form. Specific gravity 6. Tests—unalterable before the blowpipe—insoluble in acids—soluble in warm liquid ammonia, and is precipitated white by acids; the precipitate, by standing, again assumes the yellow colour. It occurs in Baltimore, in North America.

Tungstate of iron (*wolfram*) occurs of a brownish-black or brown colour, massive and crystallized. The structure is lamellar. It contains a small proportion of manganese. It occurs only in primitive rocks in Saxony and Bohemia.

Tungstate of lime (*tungsten*) is of a greyish or yellowish-white colour, translucent, occurring crystallized and massive. It becomes opaque before the blowpipe, but does not melt. It occurs in primitive rocks in Cornwall, Sweden, Saxony, and Bohemia.

TITANIUM has rarely been reduced to the metallic state, on account of the extreme difficulty which attends its reduction; but when completed, the metal is of a copper-red colour. It occurs in a variety of forms, but its only use is the production of a rich brown colour for the purpose of painting porcelain, which has, however, fallen into disuse on account of the want of uniformity. Its specific gravity is about 4·0.

Oxide of titanium comprises several varieties of this class, as under, agreeing in composition, but differing in outward appearances and specific gravity. The two varieties are Anatase and Titanite.

Anatase (*octœdrit*, Werner; *anatas*, Leonh.; *titâne anatase*, Haüy; *octohedrite*, Jamieson) occurs of a greenish-grey or reddish-brown colour, crystallized in the form of an octohedron with equal faces, with lamellar structure, and splendent lustre. It is generally semi-transparent, and frequently opaque. Its specific gravity is 3·8. It is a rare mineral, found principally near Oisans in Dauphiné, in Norway, and it is reported as having occurred in Cornwall.

Titanite (*rutil*, Leonh.; *titane oxydé*, Haüy) occurs of a reddish-brown colour, crystallized in prisms which are opaque, with a specific gravity of 4·4. It occurs with quartz, at Cairnghorm and Bengloe in Scotland, near Snowden and Bedgellart in Wales, near St. Austell in Cornwall, on the continent in the quartz of Mount St. Gothard, at Oisans in Dauphiné, and also in Bohemia, Norway, and Hungary. It is generally found disseminated in slender crystals in transparent quartz, also forming slender crystals between prisms of quartz, of which I have seen beautiful specimens from the Alps.

Iserine (*iserin*, Leonh.) occurs of a black colour, passing into a dark brown. It occurs granular, sometimes strongly magnetic, with a semi-metallic lustre. It occurs in the sand of the small river Iser in Siberia (whence its name), and also in the Riesengebirge; Dr. Traill found it in the sand of the Mersey near Liverpool. There are also other varieties of the preceding species, viz.:—

Nigrine, of a brownish-black colour, occurring in small angular masses, with lamellar structure, and externally shining. It is not magnetic. It occurs in primitive rocks in Transylvania, associated with hyacinth in Ceylon, and in the Uralian mountains.

Menaccanite (*menaccan*, Leonh.) occurs of a greyish or blackish colour, in small grains, with a glistening lustre. It is slightly magnetic, and very brittle. It was originally found near Menaccan in Cornwall, and is now found at several other places in that county.

Silicate of titanium (*crichtonite*) occurs in small rhomboidal prisms, perfectly black, opaque, and shining. It is principally found with anatase in Dauphiné.

SPHENE, or SILICO-CALCITE of TITANIUM (*sphen*, Leonh.), occurs of a greyish, reddish, or yellowish-black colour, generally amorphous, and sometimes in small rhombic prisms, slightly translucent on the edges. It occurs near Ben Nevis in Scotland, and in the Shetland islands; on the continent it is found in the department of Puy de Dôme, in volcanic rock; and in Norway and Sweden, in granite.

CERIUM has recently been added to the list of metallic ele-

ments, by Vauquelin, who succeeded in reducing it to the metallic state. It is harder and more brilliant than pure cast-iron. The specific gravity varies from 4·2 to 4·9.

Silico-oxide of cerium (*cerite*, Jamieson and Phillips) occurs of a rose-red colour, approaching brown, massive or disseminated, opaque, and difficultly frangible. Analysis of Vauquelin :—

Oxide of cerium	67·0
Silex	17·0
Oxide of iron	2·0
Lime	2·0
Water and carbonic acid	12·0
	——100·0

It is found in the primitive rock of the neighbourhood of Riddarhytta in Sweden, associated with bismuth and lead.

Allanite (*cerium oxydé silicifère noire*, Lucas) is a rare mineral, occurring of a brownish-black colour, in prismatic crystals, with a semi-metallic appearance. It is opaque, whence it is easily distinguished from yttrite (gadolinite), and also by its colour. It was discovered in West Greenland, by Professor Giesecké, but derives its name from Mr. Allan, who first described it.

Orthite can be distinguished from the preceding varieties on account of its being found in seams (in felspathic rock), and not granular or crystallized. Analysis of Berzelius :—

Cerium	19·50
Protoxide of iron	12·44
,, manganese	3·44
Yttria	3·44
Silex	32·00
Alumina	14·80
Lime	7·84
Water	5·36

It occurs in the neighbourhood of Fahlun in Sweden.

Yttrocerite varies in colour from grey to red and violet. It is found in amorphous masses, investing other minerals, and opaque. Its specific gravity is 3·447. It occurs with the preceding variety at Fahlun, in the mine of Finbo.

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Cerium likewise occurs in combination with the fluoric acid, in various proportions; also with yttria. The colour is generally yellow, but in some cases also red. The analyses which have already been made have not been satisfactory, and the composition cannot, on that account, be correctly asserted.

Uranium is a brittle metal, of a reddish-brown colour, but has never been observed in the metallic state. Specific gravity, 6.

Phosphate of uranium (*uranglimmer*, Leonh.; *uranite*, Phillips) occurs generally of an emerald-green colour, but not unfrequently also of shades of yellow and yellowish-brown. It is a singular fact, also, that these two different shades of colour

are often met with in the same specimen, or even in the same crystal. It is slightly translucent, verging on transparent, but generally opaque. It occurs in thin lamellar plates, and crystallized (the primary form is the right rhombic prism). It occurs near St. Agnes in Cornwall, also in several other mines in that county, on primitive rock; near Limoges in France, and Baltimore in Maryland. It effervesces in nitric acid.

Oxide of uranium (*uran-ochre*, Phillips; *pecherz*, Leonh.) occurs of a grey or blackish colour, in globular masses, massive and disseminated, also pulverulent. It has a vitreous appearance, and is slightly translucent on the edges. It occurs in the Tincroft mine with uranite.

COLUMBIUM is one of the late discoveries in metallurgy, and was formerly considered as a different metal from *tantalium*, which, however, has been proved by Dr. Wollaston to be the same. It has only lately been reduced to the metallic state, when it assumes a dark grey colour. Specific gravity, 6·0. It occurs in combination with oxygen in the mineral known by the name of *columbite* (*tantalite*, Jamieson), the colour of which is bluish-black; and it occurs in small flat quadrangular prisms, striated longitudinally; also in crystalline masses. The analysis of a specimen by Wollaston yielded oxide of columbium 80, oxide of iron 15, oxide of manganese 5. It occurs at Bodenmais in Bavaria, and in Connecticut in North America; it likewise occurs in combination with yttria (*yttrotantalite*), of an iron-black colour, occurring in small angular pieces. Specific gravity, 5·1. The constituent parts are oxide of columbium 45, and yttria 55. It is found associated with yttrite at Ytterby in Sweden, and at Rickerlamsan in Greenland.

CHROME is a brittle metal, of a greyish-white colour, and 5·9 times heavier than water. It is only found in the state of an oxide or an acid, when it forms a constituent in the ruby. It is used for producing a green colour in the porcelain manufacture.

Oxide of chrome occurs of a bright green colour, either pulverulent or crystalline compact. It occurs in the island of Uist, one of the Shetland group, also in Burgundy. The green colour is changed to yellow by heating, and it is soluble by boiling in the alkalies, imparting to them a green colour, which disappears upon continuance of the heat, and the oxide is precipitated.

COBALT occurs in a variety of forms in nature, though not in the native state. It is of a grey colour, possessing considerable magnetic properties. Specific gravity, 7·7. It occurs in both primitive and secondary mountains, and is employed for producing a fine blue colour in the glass and porcelain manufactures.

Arseniate of cobalt (*bright white cobalt*, Phillips) occurs of a yellowish-white colour, crystallized in the form of the cube, and the modifications of that figure. It occurs in the primitive rocks

in Norway, Silesia, and Sweden. Analysis: cobalt 44, arsenic 55, and sulphur 0·50.

Grey cobalt contains an additional portion of sulphur, and is of a greyish-black colour externally. It is found in amorphous masses, but never crystallized. The analysis of Stromeyer determines it to be composed of cobalt 33·10, arsenic 43·47, iron 3·02, sulphur 20·08, water 1·33. It occurs near Dolcoath in Cornwall, and in Bohemia, Saxony, Silesia, France, and Hungary. A second variety occurs botryoidal, and crystallized in cubes and octohedrons, possessing a tin-white colour. It contains cobalt 20·31, arsenic 74·21, iron 3·42, and copper 0·15. It occurs in Saxony and Bohemia.

Oxide of cobalt (*bloom of cobalt*, Phillips) occurs of a rose-red colour, and sometimes greyish or brownish-grey. It occurs investing and in botryoidal masses, and also in acicular prisms; it is soft. Analysis of a specimen from Dauphiné: cobalt 30, arsenic 22, oxygen 11, and water 27. It occurs in Cornwall in the Botallack mine, near Land's End, near Edinburgh, and in Dauphiné, Hungary, and Saxony.

Sulphuret of cobalt (*cobalt sulphuré*, Lucas) occurs of a yellowish or greyish colour, massive and botryoidal. It fuses on charcoal before the blowpipe, yielding sulphurous odours. It occurs near Bastudes in Sweden.

Sulphate of cobalt (*red vitriol*, Phillips) occurs of a rose-red colour, stalactitic, or investing other minerals. Analysis of a specimen by Koppen: cobalt 38·71, sulphuric acid 19·74, and water 41·55. It occurs in the Tyrol and Suabia.

Nickel occurs of a tin-white colour, is attractable by the magnet, ductile and malleable, difficultly fusible, and nine times heavier than water.

Native nickel (*gediegen nickel*, Leonh.; *haarkies*, Werner; *nickel natif*, Haüy) occurs in filaments of a yellowish or brownish-grey colour, flexible, but not magnetic. It contains a small portion of arsenic. It occurs near St. Austell in Cornwall, in Saxony, and Bohemia.

Arsenical nickel (*copper nickel*, Jamieson; *kupfer nickel*, Leonh.) occurs of a reddish or yellowish-red colour, which tarnishes on exposure. It occurs massive, botryoidal, and dendritic, somewhat brittle and shining. Analysis: nickel 44·2, arsenic 54·7, with a slight portion of iron and sulphur. It occurs in primitive rocks in Cornwall, Saxony, Bohemia, France, and the United States.

Arseniate of nickel (*nickel ocker*, Leonh.) accompanies arsenical nickel, is of an apple-green colour, forming a coating to that mineral. It is soluble in acids, and has most probably originated from the spontaneous decomposition of arsenical nickel. The localities are the same.

Lead occurs of a bluish-grey colour, and is malleable, ductile,

and soft, with a specific gravity of 11·3. It is used in a variety of ways, too numerous to notice, the most useful being in medicine, in the formation of several alloys, and printing-types.

I. *Sulphuret of lead* (*galena*, Phillips) occurs of a lead-grey colour, massive, and of lamellar structure; also crystallized in the form of the cube and regular octohedron. It possesses a brilliant metallic lustre, and is very brittle. Analysis of a specimen from Wales: lead 78, sulphur 21. It decrepitates before the blowpipe, emitting a sulphurous odour, and finally melts into a metallic globule. It occurs in primitive and secondary mountains in beds, associated with iron, copper, zinc, and silver; the principal localities being Durham, Wales, Cornwall, the Vosges in France, the Saxon Erzgebirge, and North America. Phillips notices the several varieties separately, and enumerates *granular*, *compact*, *specular*, *antimoniferous*, *argentiferous*, and *super-sulphuret*, as varieties. The metal is procured by pounding and roasting the ore, in order to drive off the arsenical and sulphurous vapours. The annual produce of Great Britain is 50,000 tons.

II. *Blue lead* (*blaubleierz*, Leonh.; *plombbleu*, Brong.) is a variety of sulphuret of lead. It occurs of a lead-grey or indigo-blue colour, massive, in six-sided prisms, and is rough and dull. Specific gravity, 5·4. It occurs in Cornwall, and at Zschoppau in Saxony.

III. *Bournonite* (*schwarz spiesglaserz*, Werner) is of a steel-grey colour, with a shining lustre. It occurs crystallized in rectangular prisms, possessing a lamellar structure. It possesses the same property of decrepitating before the blowpipe as the common sulphuret. It occurs in the parish of Endellione in Cornwall.

Oxide of lead (*native minium*, Smithson) occurs of a scarlet colour, amorphous, and rarely pulverulent. It is supposed to arise from the decomposition of galena. It occurs at Badenweiler, and in Siberia.

Carbonate of lead (*weiss bleierz*, Leonh.; *plomb blanc*, Brong.) occurs of a yellowish or whitish-yellow colour, in tabular crystals, and in prisms striated longitudinally, and closely aggregated, also massive. It possesses the property of double refraction. Specific gravity, 6·72. It effervesces in muriatic acid. It occurs in several mines in Durham, Wales, Cornwall, and in Saxony, Bohemia, Silesia, and Hungary. It occurs with a slight proportion of copper in some localities.

Muriate of lead (*murio-carbonate of lead*, Phillips; *hornblei*, Werner; *plomb muriaté*, Brong.) occurs of a greyish colour, passing into yellow, and crystallized in four-sided rectangular prisms. It is transparent or translucent, soft, and easily frangible. Specific gravity, 6·0. It occurs in Germany, near Badweiler, and in the United States.

Phosphate of lead occurs of a green, yellowish-green, or yellow colour, crystallized in six-sided prisms, easily frangible, and transparent. Specific gravity, 6·4. It occurs in Cornwall, the Harz, Saxony, and Bohemia.

Arseniate of lead (*plomb arsenieté*) occurs of a pale yellow colour, passing into grass-green, translucent, rarely transparent, and easily frangible. Specific gravity, 5·6. It occurs in Cornwall, between Redruth and Truro.

Sulphate of lead occurs of a greyish-white colour, crystallized in rhombic prisms, with diedral summits, and transparent. It is brittle. Specific gravity, 6·3. It occurs near St. Ives in Cornwall, in the Parys mine in Anglesea, and in the Harz mountains.

Molybdate of lead (*gelbes bleierz*, Werner; *plomb jaune*, Brong.) occurs of a yellow colour, and crystallized in acute octohedrons, translucent, and brittle. It rarely occurs massive. It occurs at Bleiberg in Carinthia, and in the Tyrol, Austria, and Transylvania.

Chromate of lead (*rothbleierz*, Werner; *plomb rouge*, Brong.) occurs of an orange-red colour, crystallized and massive, translucent, rarely transparent, and brittle. It gives a green colour to borax before the blowpipe. It occurs in the gold-mine of Beresof in Siberia.

Zinc is of a bluish-grey colour, possessing a small degree of tenacity, is ductile, malleable, and seven times heavier than water. It is used in medicine, and for coins in China.

Sulphuret of zinc (*blende*, Phillips; *blend*, Leonh.; *blende*, Brong.) occurs of a brownish, yellowish, or reddish-brown colour, amorphous, and crystallized in a variety of forms, the primary being a rhombic dodecahedron. It occurs in primitive and secondary rocks in Cornwall, Scotland, Durham, Norway, and various parts of Germany.

Oxide of zinc occurs of various shades of red, massive, disseminated, and micaceous. It is translucent, brittle, and has a specific gravity of 6·2. It occurs in New Jersey in North America.

Carbonate of zinc (*calamin*, Leonh.; *zinc carbonaté*, Haüy; *calamine*, Phillips) occurs crystallized, compact, earthy, and pseudo-morphous; the crystallized varieties of a green colour, and of the form of acute rhomboids. The latter varieties of a yellowish-brown colour. It occurs in beds in secondary limestone in Somersetshire, Derbyshire, and Durham.

The ores of zinc contain a new chemical metallic element, *cadmium*, which never occurs pure in nature. The presence of it in the carbonate of zinc can be detected by placing a small quantity, pounded, on a piece of platina foil, and by passing this over the blue flame of a candle, the cadmium will be reduced and deposited in the form of a reddish-brown protoxide on the platina.

Class III.—INFLAMMABLE MINERALS.

Several of these substances are found in a liquid, others in a solid state, when they are easily broken. They are only about twice as heavy as water. Most of the metals, when altered by combustion, acquire an increase of weight, whereas this class are sensibly diminished in weight by the same process.

Carbon (*diamond*). The combustible properties of this rare mineral being fully known, it deserves the first place among this class. They are either colourless, or slightly tinged with yellow, blue, or yellowish-green. They are always found in crystals, varying in size and in form, and varying from transparent to nearly opaque. When heated, they become phosphorescent, and are the hardest of all substances. They burn at a heat inferior to the melting point of silver, and yield as much carbonic acid as charcoal, whence they appear to consist of pure carbon. The diamond region of India extends over a tract of country reaching from Bengal to Cape Comorin, the principal being at Golconda. Very fine diamonds have been found at Pastael, twenty miles from Golconda, among which may be enumerated the Pitt, or Regent Diamond. The diamond-mines of Brazil are situate due north of the river Janeiro, where they are found imbedded in the sandstone grit, of which the country is principally composed; also in the mud of the rivers. The largest diamond extant is in the possession of the Rajah of Mattan, in the island of Borneo; and nearly resembles an egg, with an indented hollow near the smaller end.

Coal comprehends a variety of carboniferous minerals, generally speaking, of great importance and mineralogical interest.

Common coal (*steinkohl*, Leonh.; *charbon de terre*—French) occurs massive only, of a shining black colour, generally splendent, though sometimes also dull. It occurs in secondary districts of country, particularly in the counties of Durham, Northumberland, Stafford, and Gloucester, in England; also in South Wales and in Flintshire; in Ireland; in Belgium in the environs of Liège, in France and Germany; and North America. It contains a great number of vegetable remains, particularly of those of the fern tribe; and in several instances whole trunks of trees, several feet in height, have been found imbedded in it.

Anthracite coal (*blind coal*, Phillips; *glanzkohle*, Leonh.; *anthracite*, Brong.) occurs massive, slaty, and columnar, of an iron-black colour, very splendent, and sometimes tarnished. Some varieties possess a very splendent variegated appearance. It occurs in the Staffordshire district, and also in South Wales. Anthracite is the most abundant coal of North America. It burns without either smell or flame, and on that account can be easily distinguished from common coal.

Cannel coal (*kennel kohle*, Leonh.; *houille*, Haüy) occurs massive, of a greyish-black colour, a resinous lustre, and flat conchoidal fracture. It decrepitates when burnt, but yields a bright flame. It occurs principally as the uppermost bed of the coal deposits in this country and Scotland, and is used in the place of candles in some places, whence its name.

Jet (*pechkohle*, Leonh.; *jayet*, Haüy) occurs of a dull black colour, resinous in lustre, and with a perfect conchoidal fracture. It occurs in masses similar to layers in the shale of the environs of Whitby, in Yorkshire, and is found at many places in France and Germany. It burns with a bituminous odour and greenish flame.

Brown coal, or wood coal (*braunkohle*, Leonh.; *lignite*, Werner) occurs of various shades of brown, sometimes earthy, but more commonly fibrous. It burns with a weak flame and strong odour, resembling that of peat, when burnt. It yields readily to the knife. It occurs near Bovey, in Devonshire, whence it has received the name of Bovey coal; also in Thuringia, France, Bavaria, Saxony, and Silesia.

BITUMEN occurs in three varieties, viz.—

1. *Earthy bitumen* (*erdiges erdpech*, Leonh.; *bitume glutineuse*, Haüy) occurs of a dull blackish-brown colour, earthy, sectile, and soft. It burns with a clear flame and agreeable odour. It occurs at Carharrack mine in Cornwall, in France, the Harz mountains, and Asia.

2. *Compact bitumen* (*schlakiges erdpech*, Leonh.; *bitume solide*, Haüy; *asphalt*) occurs of a brownish-black colour, massive, brittle, and of a shining resinous lustre; specific gravity is but little more than water. It occurs in Cornwall, France, Germany, and in the Dead Sea.

3. *Elastic bitumen* (*elastiges erdpech*, Leonh.; *bitume élastique*, Haüy) occurs of various shades of brown, and is soft and elastic, about the weight of water, possessing a strong bituminous odour. It burns with a large flame and much smoke, and has received the name of "mineral caoutchouc," on account of its elasticity.

Bitumen is one of the oldest minerals of which we have any record. It was used by the Egyptians for cement, and for embalming.

PETROLEUM occurs of a reddish-black colour, rather thicker than common tar, possessing a disagreeable bituminous odour, and burning with a very thick black smoke. It occurs at Ormskirk in Lancashire, at St. Catherine's Well near Edinburgh, and in the Hebrides; also in France, and plentifully in Persia.

NAPHTHA (*le napthe*, Brong.) occurs of a slightly yellowish colour, transparent, burning with a blue flame and much smoke. It is the only fluid which contains no oxygen, and on this account is much used for chemical purposes, to preserve substances which usually ignite when in contact with any sub-

stance containing that gas. It occurs in Asia, Italy, Sicily, and America.

Amber (*bernstein*, Leonh.) occurs of various shades of yellow or light brown, in roundish masses enclosing insects, either ants, spiders, flies, or the ichneumon—this last is, however, rare. It is generally transparent, possessing strong electric properties. It yields, by distillation, *succinic acid* (or acid of amber, from *succinum*, the Latin for amber), leaving a black shining coal. It belongs to the tertiary formation, and occurs in Germany, Prussia, France, Greenland, Moravia, and occasionally in the gravel near London.

Sulphur (*schwefel*, Leonh.; *soufre*—French) occurs in a variety of forms, either crystallized, compact, earthy, investing, or cellular. The form of the crystal is the acute octohedron. It possesses a conchoidal fracture, burning with a blue flame and suffocating odour. It is of two formations, *natural* and *volcanic*; the first occurring in beds in primitive and secondary rocks in Hungary, Spain, and Switzerland; and the second, in deposits in the neighbourhood of volcanic districts. The most remarkable deposits are those of Solfaterra, near Naples, and the sulphur island in the Japanese Sea. The specific gravity of sulphur is 2·0.

EXHIBITION OF INDUSTRY OF ALL NATIONS,

TO BE HELD IN LONDON IN 1851.

For the earliest suggestion of forming in England periodica Exhibitions of the Products of Industry, the nation is indebted to H. R. H. Prince Albert, President of the Society of Arts and Sciences, and whose object was communicated to some of its members in 1845. Various committees were then formed, with a view of carrying out the object, but the public evinced an indifference to the measure, and manufacturers were found to be lukewarm in its promulgation and assistance,—hence the attempt was for a time abandoned. In the course of the past year, several meetings having been held, and it was in the end determined upon, that an Exhibition for the Products of Industry of "all Nations" should take place in London, the month of May, 1851, being named as affording complete time for collating the various and numerous articles and products which should render the exhibition one of importance and universal interest. The progress made by the Committee since their appointment has

appeared in the leading journals and various publications devoted to science, and in January last no less than six thousand influential names were subscribed and transmitted to the Executive Committee as supporters of the plan.

On the 8th of that month the Royal Commission was issued, and shortly afterwards the general details were made public. As in these the products of the mineral kingdom take a prominent position, we have pleasure in submitting the first Report, together with a Classified List, and the Local Committees at present formed.

Report.

Her Majesty's Commissioners for the promotion of the Exhibition of the Works of Industry of all Nations, to be holden in 1851, having had the various subjects of their inquiry under their anxious consideration, are now prepared to state, for the information of the public, the progress they have made in determining on the different points referred to in their announcement of the 11th January last.

The decisions they have been able to come to have been necessarily limited by their present want of knowledge as to what pecuniary means will be placed at their disposal; and the shortness of the time during which this vast organization will have to be completed, renders it imperative upon the commissioners to make an earnest appeal to the country, to enable them, as soon as possible, to know upon what amount of subscriptions they may ultimately rely.

The scale upon which this important undertaking will be conducted must depend entirely on the amount of pecuniary support which it shall receive from the public. Her Majesty's commissioners appeal with confidence to all classes of the community, to enable them to make such liberal arrangements as will insure the success of this undertaking, in a manner worthy of the character and position of this country, and of the invitation which has been given to the other nations of the world to compete with us in a spirit of generous and friendly emulation.

The commissioners have fixed upon the 1st day of May, 1851, for opening the exhibition.

The commissioners will be prepared to receive and take charge of, at the expense of the commissioners, all articles which may be sent to them, and delivered at a place to be named by the commissioners in London, on or after 1st of January, 1851, and will continue so to receive goods until the 1st of March inclusive, after which day no further goods will be received.

Her Majesty has been graciously pleased to grant a site for this purpose on the south side of Hyde-park, lying between the Kensington-drive and the Ride commonly called Rotten-row.

From the approximate estimate which the commissioners have

been able to make, they believe that the building ought to cover a space of from 16 to 20 acres, or about one million of square feet.

The productions of all nations will be exhibited together, under one general classification.

The articles exhibited will be divided into four sections, as before announced, and a classified list, together with general instructions affecting each department, are appended.

The building will be provided to the exhibitors free from rent, and will be fire-proof.

Exhibitors will be required to deliver their objects, at their own charge and risk, at the building in the Park; but no charges of any kind will be made whilst they remain there.

Colonial and foreign productions will be admitted without paying duty, for the purposes of exhibition, but not for internal consumption. Her Majesty's Commissioners of Customs will consider all such articles as bonded goods; and her Majesty's commissioners for the exhibition of 1851 will make suitable arrangements for their reception.

Her Majesty's commissioners are desirous that there should be complete local organization, and that the local committees, wherever formed, should themselves collect the subscriptions within their own districts. The local committees should advertise all subscriptions they receive, and defray all local expenses, paying such commission for collection as they may think necessary.

Her Majesty's commissioners think that the same complete system of organization should be extended as much as possible to the British Colonies.

Subscriptions should be paid to the treasurers of local committees, and by them transferred to the general fund at the Bank of England, in the name of A. K. Barclay, Esq., W. Cotton, Esq., Sir J. W. Lubbock, Bart., S. M. Peto, Esq., M.P., and Baron Lionel de Rothschild, M.P.

Her Majesty's commissioners having undertaken the absolute control over the expenditure of all money that may come into the hands of their treasurers, have made arrangements for auditing accounts, and insuring the strictest economy.

Her Majesty's commissioners hope that the funds to be placed at their disposal by voluntary contributions may be such as to enable them so to regulate the amount to be paid for entrance that all classes may be enabled to visit the exhibition.

Should any surplus remain, after giving every facility to the exhibitors and increasing the privileges of the public as spectators, her Majesty's commissioners intend to apply the same to purposes strictly in connection with the ends of the exhibition, or for the establishment of similar exhibitions for the future.

However large the building may be, the quantity of articles

sent for exhibition may exceed any amount of space that may be provided ;—her Majesty's commissioners consequently reserve themselves ample powers of rejection and selection. Upon the amount subscribed must necessarily depend the space which they may be enabled to allot, but under all circumstances they will have to exercise a certain discretion.

Her Majesty's commissioners also desire that the local committees will, as early as possible, procure an inventory or general specification of articles proposed to be exhibited from their districts, and of the space which will be required for their exhibition, in order to enable the commissioners to determine as soon as possible the extent and the proportions of the building.

Her Majesty's commissioners are in communication with the Foreign Office concerning the means of informing foreign governments of the arrangements making for the exhibition.

Her Majesty's commissioners are considering the principles upon which the prize fund of 20,000*l.* shall be appropriated, and the best mode of adjudication.

If there may be any points upon which the local committees may require information, and will address themselves to the secretaries of the commission, her Majesty's commissioners will be happy to afford it to them, so far as it may be in their power.

CLASSIFIED LISTS OF OBJECTS

Which may be admitted to the Exhibition of the Works of Industry of all Nations, to be opened in London, 1st May, 1850.

Section I. Raw Materials and Produce,—illustrative of the natural productions on which human industry is employed.

Section II. Machinery for Agricultural, Manufacturing, Engineering, and other purposes, and Mechanical Inventions,—illustrative of the agents which human ingenuity brings to bear upon the products of nature.

Section III. Manufactures,—illustrative of the result produced by the operation of human industry upon natural produce.

Section IV. Sculpture, Models, and the Plastic Art generally,—illustrative of the taste and skill displayed in such applications of human industry.

This division of the objects for exhibition into four sections will be generally preserved. Articles belonging to one section may, however, be admitted to another, where they may be considered necessary, but in such cases for illustration only.

SECTION I.—RAW MATERIALS AND PRODUCE.

Under raw materials in this section are to be included all products of the Mineral, Vegetable, and Animal Kingdoms, either in an entirely raw state, or in any stage of preparation, previous to arriving at the state of a finished manufacture (as in Section III.). They are classified according

to their uses to man, in their original state and in their chemical and mechanical transformations.

(A.)—MINERAL KINGDOM.

1. Used in Metallic Manufactures :—

(*a.*) ORES, AND MODES OF DRESSING.

Native Metals, or Metallic Ores,—the modes of dressing, such as crushing, stamping, jigging, buddling, or otherwise rendering them merchantable; as in the cases of antimony, arsenic, bismuth, cadmium, cobalt, copper, gold, iron, lead, mercury, nickel, palladium, platinum, silver, tin, zinc, &c.

(*b.*) METALLURGICAL PROCESSES.

The Various Methods of Roasting and Smelting the Ores, so as to illustrate processes. Fluxes, slags, and other materials which may serve the purposes of illustration. The various processes used in adapting metals for particular purposes, as for making iron into cast iron, malleable iron and steel, &c.

(*c.*) ALLOYS.

Bronzes of various kinds, such as statuary, gun, bell, and speculum metal, Britannia metal, brass of different kinds, German silver, Argentine and other varieties of white metal, pewter, type metals, sheathing metal, compounds of metals with phosphorus and other non-metallic bodies, &c.

(*d.*) METALS IN PROCESS OF ADAPTATION TO FINISHED MANUFACTURES.

Rolled and drawn in sheets, wires, &c., and cast in pigs, bars, &c., plated and electrotyped metals, &c.

2. Chymical Products :—

(A.) CHYMICAL SUBSTANCES EMPLOYED IN MANUFACTURES.

(*a.*) *Non-Metallic Substances.*

Such as carbon in its various states for the purposes of fuel, charcoal, coke, bituminous coal, anthracite, lignite, artificial fuels, products of distillation of coals, mineral oils and naphtha; phosphorus in its different states; sulphur as in the manufacture of sulphuric acid, &c.; muriatic acid, nitric acid, boracic acid, &c.

(*b.*) *Alkalies, Earths, and their Compounds.*

Such as potash and its salts, as carbonate, sulphate, and chlorate of potash; nitre, native and artificial, the latter as made in Asia, France, Switzerland, Sweden, and as used for gunpowder, &c.; soda and its salts, as common salt and its various modes of preparation, nitrate of soda, borax, soda ash, and carbonate of soda native and as prepared either from salt, barilla, or kelp, and as used for soap or glass-making, &c.; sulphate of soda, &c.; lime and its compounds, as limestone, chalk, marbles, mortars, and hydraulic limestone, cements, materials for frescoes, plaster of Paris, gypsum, alabaster, bleaching powder, &c.; magnesia, and the materials for

preparing it and its salts; barytes, as sulphate of barytes; strontia for coloured fires, &c.; alumina, as alum slate, alum, sulphate of alumina, &c.

(c.) Metals Proper, and their Compounds.

Such as iron and its salts, iron pyrites for green vitriol, colcothar, ochre, Venetian red, or as used for calico printing and dyeing, sulphate of iron as used for making sulphuric acid, &c.; copper, as acetate and sulphate of copper as used for colours and dyeing, for electrotyping, &c., verdigris, Scheeles' green, verditer, carbonate of copper, &c.; zinc and its salts, zinc paint, &c.; tin and its compounds, as salts of tin, stannates, oxymuriate, &c.; lead, as white lead, acetate and nitrate of lead, Naples yellow, &c.; chromium, as chrome ore, chromates of potash, yellow and orange chromate of lead, oxide of chromium for colours, as for glass, pottery, &c.; arsenic, as Scheeles' green, orpiment, realgar, &c.; antimony, as sulphuret of antimony for percussion powder, lucifer matches, &c.; bismuth, as pearl white, &c.; cobalt, as oxide of cobalt for pottery colours, smalt blue, &c.; nickel, for glass staining, &c.; tungsten, as the yellow oxides, tungstates for dyeing, &c.; mercury, as for philosophical instruments, silvering mirrors, &c.; gold, platinum, silver, and the other noble metals, their preparations for electrotyping, giving of metallic lustres, &c.

(d.) Mixed Chemical Manufactures.

Such as soap, prussiate of potash and Prussian blue, ultramarine, &c.

(B.) CHEMICAL SUBSTANCES USED IN MEDICINE.

(a.) Non-Metallic Substances.

As iodine, bromine, chlorine, sulphur, phosphorus, charcoal, and their compounds, &c.

(b.) Alkalies, Earths, and their Compounds.

As carbonates, chlorides, sulphates, nitrates, phosphates, &c., and other compounds of potash, soda, lime, and magnesia, &c.

(c.) Metallic Preparations.

As calomel, corrosive sublimate, red oxide, and bisulphuret of mercury, and other compounds; salts of silver, copper, iron, antimony, zinc, &c.

(C.) RARER SUBSTANCES, MANUFACTURED CHIEFLY FOR THE USE OF THE SCIENTIFIC CHEMIST.

Iodine, bromine, selenium; potassium, sodium, and other rare metallic bases and their compounds, &c.

3. USED IN THE MANUFACTURE OF GLASS, POTTERY, AND EARTHENWARE:—

(A.) GLASS.

(a.) Coarser Materials used in Glass-making.

As sand, chalk, carbonates of soda and potash, sulphate of soda, gypsum, common salt, rock salt, soapers' waste, gas lime, lime clay, &c.

(b.) Colours and Chemical Materials used in further Processes of Glass-making.

Compounds of arsenic, antimony, boracic acid, borax, barytes, copper, chromium, cobalt, gold and iron, litharge, red lead, oxides of manganese, nickel, uranium, silver, saltpetre, smalt blue, phosphate of lime, &c.

(c.) Various kinds of Glass used for Manufactures.

Soluble or water glass, crown, window, and mirror; crystal, flint, and strass glass; German sheet and plate glass; glass for optical and for laboratory purposes; coloured and stained glass, enamel, aventurin, glass for artificial gems, &c.

(B.) PORCELAIN AND POTTERY.

(a.) Materials used, and the modes of dressing and preparing them for use.

Kaolin, Cornish stone, plastic clays, sand, quartz, flints, felspar, chalk, gypsum, soda, potash, salt, alum, borax, bone ash, peroxide of tin, oxides of lead, cobalt, nickel, chromium, iron, copper, manganese, &c.

(b.) Finer kinds, as used for Manufacturing Purposes.

Porcelain hard and tender, earthenware, stone ware, flint ware, fayence, delft ware, ironstone china, &c. Materials and processes illustrating the mixing, mouldings, pressing, drying, glazing, colouring, printing, staining, painting and gilding, &c.

(c.) Coarser kinds, as used for Manufacturing Purposes.

Materials for bricks, house and field draining tiles and pipes, common jars, bottles, pans, &c.

4. STONES AND MINERAL SUBSTANCES FOR BUILDING IMPLEMENTS AND DECORATION:—

(a.) EMPLOYED IN ARCHITECTURE AND ENGINEERING.

Granites, sandstones, limestones, serpentines, porphyries, marbles, bricks, tiles, earthen tubes, artificial stones, plasters, cements, earths, pounded rocks, and other paints made with simple natural substances, &c.

(b.) IMPLEMENTS.

Grindstones, chert, honestones, diamonds, rubies, emery, and other hard materials for cutting gems, less valuable materials and glass, or as used in the construction of watches, &c.

(c.) PERSONAL DECORATION.

Gems of all kinds, and all varieties of mineral substances used for decoration, as agates, cornelians, onyxes, lapis lazuli, &c.

(B.)—VEGETABLE KINGDOM.

1. Substances used chiefly as Food, or in its Preparation :—

I. Agricultural produce .. .. { Cereals. Pulses. Oil seeds, &c.
II. Dried fruits and seeds.
III. Substances used in the preparation of drinks.
IV. Spices and condiments.
V. Starch series.
VI. Sugar series.
VII. Fermented liquors and distilled spirits from unusual sources.

2. Materials used chiefly in the Chemical Arts, or in Medicine :—

VIII. Gum series.
IX. Resin series .. .. .. { Resins and balsams. Gum resins. Gum elastic.
X. Oil series .. .. { Volatile oils. Drying fat oils. Non-drying fat oils. Solid oils. Wax.
XI. Acids.
XII. Dyes and colours.
XIII. Tanning substances.
XIV. Intoxicating drugs.
XV. Medicinal substances.

3. Materials for Building, Clothing, etc. :—

XVI. Fibrous substances—cordage and clothing materials.
XVII. Cellular substances.
XVIII. Timber and fancy woods, for construction and ornament, and prepared by dyeing, &c.

4. Miscellaneous Substances :—

XIX. Miscellaneous substances not elsewhere enumerated.

(C.)—ANIMAL KINGDOM.

1. Substances used as Food :—

Almost every part of almost every species of animal serves as food to some variety or other of the human race. Preparations of food as examples of industrial products, for the exhibition, would comprise, —specimens of preserved meats for long voyages; portable soups; concentrated nutriments; consolidated milk, &c.; dried gelatine, isinglass, and albumen; caviare; trepang; sharks' fins, nests of the Java swallow, and the like articles of Eastern commerce; honey and its preparations.

2. SUBSTANCES USED FOR MEDICINAL PURPOSES :—

Cod liver and other animal oils, for internal or external application.
Unguents of spermaceti, lard, oil, and combinations of these.
Musk, castoreum, civet, ambergris (as antispasmodics).
Phosphorus and ammonia (from bones, hartshorn, urine).
Crabs' eyes, or the calcareous concretions formed in the craw fish; and cuttle bone, used as antacids.
Cantharides, and their essence cantharidine.
Iodine (obtained from marine zoophytes and sponge).

3. SUBSTANCES USED IN MANUFACTURES :—

(*a.*) FOR TEXTILE FABRICS AND FOR CLOTHING.

Wool, hair, hair bands and ropes; bristles, whalebones.
Silk from the silkworm, *Bombyx mori*, and from other species in India, *e. g. Bombycilla Cynthia* and *Attacus Paphia*.
Feathers, down, fur.
Skins, hides, leather.
Elytra or beetle wings (for ornaments of dress).
Byssus, from the pinna shellfish (manufactured into gloves).

(*b.*) FOR DOMESTIC OR ORNAMENTAL PURPOSES, OR FOR THE MANUFACTURE OF IMPLEMENTS.

Bone, horn, hoofs, ivory, tortoiseshell, shagreen, parchment, vellum, quills.
Pearls (*Meleagrina margaritifera, Unio margaritifera*); seed pearl (*Mytilus edulis*).
Coral.
Oils, tallows, spermaceti, wax, lard.
Silkworm gut.
Mother of pearl (shells of *Meleagrina, Haliotis*, and *Turbo*)—buffalo shells, Bombay shells, black shells, white-edge shells, yellow-edge shells, flat shells, green snail shells.
Sponge, goldbeaters' skin, catgut, bladders.

(*c.*) AS AGENTS IN THE MANUFACTURE OF VARIOUS ARTICLES.

Glue, isinglass, gelatine.
Bone black, ivory black, animal charcoal.

(*d.*) FOR THE PRODUCTION OF CHYMICAL SUBSTANCES.

Bones, &c. (for phosphorus, ammonia, cyanides, &c.).

(*e.*) FOR PIGMENTS AND DYES.

Cochineal, carmine, from the *Coccus cacti;* dyes from the galls of aphides; gall stone pigment from ox gall; lac, a substance obtained from an Indian species of *coccus*, and the varieties called in commerce *stick lac, seed lac, lump lac, shell lac, lac lake, lac dye*, sepia, Essence d'Orient, from scales of bleak (*Leuciscus*), used in the manufacture of artificial pearls.

SECTION II.—MACHINERY.

Division A.—Machines for Direct Use.

1. PRIME MOVERS.

As boilers and furnaces for generating steam, steam-engines, water-wheels and other hydraulic movers, windmills, other engines for generating power, &c.

2. SEPARATE PARTS OF MECHANISM AND GEERING.

As toothed wheels, linkwork, belts, couplings, contrivances for modifying motion, for reversing and stopping, and for the government and self-action of machinery, &c. Specimens of perfection in workmanship—such as straight edges, flat surfaces, screws, spheres, &c.

3. MACHINES FOR RAISING AND MOVING BODIES.

Raising water and other liquids, as pumps, fire engines, hydraulic rams, &c.

Raising and moving weights and producing pressure, such as crabs, cranes, travellers, screw jacks, hydraulic presses, pile drivers, &c.

Carriages and vehicles.

Machinery of the railway system.

Naval mechanism and naval architecture.

4. MACHINES FOR WEIGHING, MEASURING, AND REGISTRATION.

As weighing machines of all kinds, apparatus for the measurement of length and capacity, for the registration of natural phenomena, and of the results and operations of other machinery, as tide gauges, anemometers, calculating machines, tell-tales, counting machines, numbering frames, copying machines, dynamometers, &c.

Turret and other clocks, watches, and chronometers.

Mathematical and philosophical instruments, as astronomical and optical instruments, apparatus for the graduation and division of lines and circles, physical and chymical apparatus.

5. INSTRUMENTS AND MISCELLANEOUS CONTRIVANCES.

Drawing instruments and apparatus used by artists and engravers.

Musical and acoustical instruments, as organs, pianofortes, harps, flutes, imitation of the human voice in singing and speaking, &c.

Surgical instruments.

Locks, and small machines for miscellaneous purposes.

6. CANNON AND SMALL ARMS, PISTOLS, &c.,

And all that belongs to their equipment.

7. AGRICULTURAL MACHINERY.

Field Implements—As ploughs, subsoil-plough, skim-plough, harrows, Norwegian harrow, clod-crusher, grubber, or scarifier; corn-drill, turnip-drill, water-drill, dry-manure machine, liquid-manure machine, horse-seed dibbler, roller, presser, horse-hoe, one-horse cart, horse-rakes, hay-making machines.

Yard Implements—Thrashing-machine, corn-dressing machine, chaff-cutter, turnip-cutter, cake-bruiser, corn-bruiser; movable steam-engine; tile-machine, draining tools.
Garden implements.

Division B.—Manufacturing Machines, or Systems of Machinery, Tools, and Implements employed for the undermentioned purposes:—

1. Manufacture of all fabrics that are spun, woven, felted, or laid.

Machinery for the complete formation from the raw material of all fabrics of cotton, wool, flax, hemp, silk, caoutchouc, hair, &c.
Paper making and staining.
Printing and bookbinding.

2. Manufactures of metals.

The manufacture of metals from the ore into bars, rods, wire, sheets, and other general forms; also casting and polishing of metal, glass, &c.
The cutting and working of metals by machine tools, such as lathes, machines for planning, drilling, boring, slotting, sawing, stamping, shearing, rivetting, punching, &c.
Machines and tools used by the makers of gold, silver, and plated goods, cutlery, nails, screws, pins, needles, buttons, and metallic pens, &c.; by locksmiths, dye-sinkers, furnishing ironmongers, &c.

3. Manufactures of mineral substances.

Machines and tools for the preparation and working of all kinds of stone, granite, alabaster, slate, clay, gems, &c.

4. Manufactures of vegetable substances.

Machines and tools for the preparation and working of all kinds of wood.
Mills and other machinery for grinding, crushing, or preparing vegetable products.

5. Manufactures of animal substances.

Machinery and tools for working in horn, bone, ivory, leather, &c.

6. Machinery and apparatus for brewing, distilling, and manufacturing chymistry.

Division C.—Models of Engineering Structures, exhibiting the Application of Mechanical Contrivances.

Models of bridges, viaducts, roofs of large span, in stone, wood, iron, &c.
Models of docks, locks, lighthouses, breakwaters, harbours, landing-piers, &c.

SECTION III.—MANUFACTURES.

Manufactures to be exhibited in this Section must be in their finished State, as fit for Use.

1. Fabrics. Spun and Woven	From flax, hemp, cotton, and similar vegetable substances. From wool and silk, and similar animal substances.	as	Goods plain and figured in the loom; also printed, coloured, or embossed, including Linens, Canvas—Floor cloths, calicoes, &c.; oil-cloths of all kinds; also, lace, bobbinet, figured lace, needle-work, embroidery, tambouring, &c. Broad Cloths — Blankets, carpets, shawls, damasks, satins, velvets, stuffs, poplins, tabinets, crapes. Felts, Hats—Felted floor cloths and felted fabrics generally, plain or printed, coloured and embossed. Papers of all kinds, plain and ornamental paper-hangings and decorations, cards, pasteboard, &c.
Felted or Laid	From fur and hair, and similar animal substances. From rags and fibre, and similar vegetable substances.		
2. Manufactures in Metals.—Gold and silver, copper and zinc, iron, steel, lead, bronze, pewter, mixed metals.		as	Gold and silver, plate and jewellers' work, metal ornaments, metal mountings, buttons, locksmiths' work, wire work, general ironmongery, fenders and grates and fireirons, bronze lamps, Britannia metal wares, German silver and white metal; cutlery and steel ornaments.

3. Manufactures in Glass, Porcelain, Terra Cotta, and Earthenware of all kinds, &c.

4. Manufactures from Vegetable Substances. — Wood, straw, hemp, grass, caoutchouc, gutta percha.	as	Cabinet work and household furniture, turnery, baskets, mats and matting, cordage and cables, straw plait, utensils of every kind in caoutchouc and gutta percha, coopers' work, &c.

5. Manufactures from Animal Substances.—Ivory, bone, horn, parchment, leather, shell, hair, feathers, and bristles.	as	Handles and utensils of horn, ivory, and bone; bookbinding, leather cases, trunks, harness, boots and shoes, brushes, &c.
6. Small Wares and Chymical Compounds.	as	Umbrellas, garments, artificial flowers, fringes, gimps, beads and toys; confectionery, soap, candles, sealing-wax and wafers, &c.

SECTION IV.—SCULPTURE, MODELS, AND THE PLASTIC ART.

Objects formed in any kind of Material, if they exhibit such a degree of taste and skill as to come under the denomination of Fine Art, may be admitted into this Section.

1. Sculpture, as a Fine Art.	as	*a.* In metals, whether simple, as gold, silver, copper, iron, zinc, lead; or compound, such as bronze, electrum, &c. *b.* In minerals, whether simple, as marble, stone, gems, clay, &c.; or in materials elaborated from them, as glass, porcelain. *c.* In woods and other vegetable substances. *d.* In animal substances, such as ivory, bone, shells, shell-cameos.

2. Works in Die-sinking, Intaglios.

3. Architectural Decorations.	Whether integral or adventitious, as	In relief. In colour. Stained glass tapestry.
4. Mosaics and Inlaid Work.	In stone. In tiles. In vitrified materials. In wood. In metal.	
5. Enamels.	On metals. On china. On glass.	

6. MATERIALS AND PROCESSES APPLICABLE TO THE FINE ARTS GENERALLY, including Fine Art Printing, Printing in Colour, &c.

7. MODELS. { In architecture. In topography. In anatomy. }

CONDITIONS AND LIMITATIONS.

All spirits, wines, and fermented liquors, unless derived from unusual sources, are inadmissible, except in special cases and under special restrictions; and when oils, spirits, &c., are exhibited, to prevent accidents they must be shown in well-secured glass vessels.

All highly inflammable articles, such as gunpowder, detonating powders, lucifer-matches, &c., and all live stock, and articles perishable within the duration of the exhibition, are inadmissible, unless specially excepted.

SECTION I.—RAW MATERIALS AND PRODUCE.

DIVISION (A).—MINERAL KINGDOM.

It is desirable that the raw materials should be shown in connexion with the produce of the mineral kingdom, so as to form a history and explanation of the processes employed to fit them for the useful and ornamental purposes of life. The exhibition would thus comprehend (1) illustrations of the various modes of extracting and preparing the raw materials for produce; (2) illustrations of methods of reducing, working, or combining raw materials, so as to obtain products which may afterwards receive applications to the useful or ornamental purposes of life.

The specimens fitted for exhibition should include (1) only those remarkable for their excellence, for novelty in their occurrence or application, or economy of their extraction or preparation; or (2) those remarkable as illustrations of some further processes of manufacture.

DIVISION (B).—VEGETABLE KINGDOM.

The objects which the Commission is most desirous of receiving among the products of the vegetable kingdom are such as from their utility, novelty, or practical interest may appear especially deserving public attention. Peculiarly fine samples of substances in common use; authenticated samples of substances having similar properties, but derived from different sources, such as arrow-root, sago, &c. Dyeing materials, accompanied by specimens exhibiting the effect of such materials. Fancy wood, both in the polished, rough, and manufactured state. All sorts of materials which are applicable to the manufacture of linen, cordage, wickerwork, paper, and the like.

Nothing, however, appears suitable to this exhibition except such results of human industry as are capable of being preserved without injury through several months.

DIVISION (C).—ANIMAL KINGDOM.

As illustrations in this division, the various processes of preparation may be exhibited in connexion with the raw materials; and in some cases

a finished article may be introduced as the termination of a series of objects in preparatory stages.

Nothing, however, appears suitable to this exhibition except such results of human industry as are capable of being preserved without injury through several months.

Section II.—Machinery.

division (a).—machines for direct use.

Machines will be exhibited in motion whenever it may be desirable to do so, and it may be found practicable to provide the necessary arrangements for that purpose.

division (b).—manufacturing machines.

Although in arranging this class for exhibition it will generally be found advisable to separate products from the producing mechanism, yet the latter should always be accompanied with sufficient specimens of the raw material, in its several stages of manufacture, and of the finished product, to make the operation of the machinery intelligible.

The complete series of tools and machinery that belongs to the manufacture of any object of common use, such as a watch, a button, or a needle, accompanied by specimens of the object and its parts, in their various stages of progress, is so instructive and interesting that it is very desirable to obtain several such series for the proposed exhibition.

Section III.—Manufactures.

Manufactures to be exhibited in this section must be in their finished state, as fit for use.

All articles to be admitted in this section must exhibit one or more of the following qualifications :—

1. Increased usefulness, such as permanency in dyes ; improved forms and arrangements in articles of utility, &c.
2. Superior skill in workmanship, as in block-printing, chasing, &c.
3. New use of known materials.
4. Use of new materials.
5. New combinations of materials, as in metal and pottery.
6. Beauty of design, in form or colour, or both, with reference to utility.
7. Cheapness, relatively to excellence of production.

Section IV.—Sculpture Models, and the Plastic Art.

Objects formed in any kind of material, if they exhibit such a degree of taste and skill as to come under the denomination of Fine Art, may be admitted into this section.

The specimens exhibited shall be works of living artists.

Oil paintings, and water-colour paintings, drawings and engravings, are not to be admitted except as illustrations or examples of materials and processes, and portrait busts are not be admitted.

LOCAL COMMITTEES.

Name of Town.	Sec. of Committee.
Aberdeen	Reid, W. L.
Aberystwith	Davies, J. M.
Alton	Clements, James
Arbroath	Macdonald, John
Ashton-under-Lyne	Gartside, Henry
Barnard Castle	Monkhouse, J. C.
Barnsley	Newman, Edward
Bath	Tunstall, J., M.D.
	Akerman, W.
Batley, Yorkshire	Jubb, Samuel
Belfast	MacAdam, Jas., jun.
Beverley	Crust, Thomas
Bilston	Perry, Charles
Bingley, York	Passavant, P., jun.
Birmingham	Marshall, W. P.
Blackburn	Clark, W. J. D.
Bodmin	Bray, R.
Bolton, Lancashire	French, G. J.
Boston	Bontoft, J. A.
Bradford, York	Tee, Samuel L.
	Taylor, George
Brampton	Graham, J., M.D.
Brentford	Clarke, George
Bridgenorth	Jones, William
Bridgewater	Smith, T.
Bridport	Colfox, Thomas
Bristol	Wilkson, John
Bromsgrove	Maund, Benjamin
Buckingham	Nelson, G.
Burnley	Heelis, John
Burton-on-Trent	Richardson, John
Bury St. Edmunds	Holmes, J. H.
Bury, Lancashire	Norris, W. H.
Camborne	Beckford, T. S.
	Bridge, J. H.
Cambridge Univ.	C. Babington, M.A.
Cambridge Town	Gotobed, H.
	Harris, H. Hemingtn
Canterbury	Aris, John
Cardiff	Bird, Hugh
Carlisle	Nanson, John
Cheltenham	Gwinnett, W. H.
Chelmsford	Meggy, George
	Chancellor, Fred.
Chelsea	Rudge, Rev. E.
Chester	Maddock, J. Finchett
Chichester	Mason, J.
Chorley	Jackson, Richard
Congleton	Latham, John
Cork	Feath, G. C.
Coventry	Skidmore, F. A.
Darlington	Humble, Stephen
	Mason, George
Dartmouth	Woolridge, Col.
Deal	Reakes, Thomas
Derby	Stevens, Henry J.
	Every, Fred. S.
Devizes	Waylen, George
Devonport	Woollcombe, T.
	Norman, Alfred
Doncaster	Mason, T. B.
Dorchester	Stone, J.
Dover	Bass, T. B.
	Stillwell, J.
Dublin	Porter, W. B.
	Fry, William
Dudley	Blackwell, J.
Dundee	Milne, George
Dunfermline	Kilgour, James
Durham	Forster, J. H.
Edinburgh	Tod. James W. S.
Elgin	Duff, Patrick
Exeter	Brutton, Charles
Falmouth & Penryn	Rundell, W. W.
Fleetwood	Stewart, J.
Frome	Walters, G., jun.
Glasgow	Johnson, William
	Liddell, Andrew
	Strang, J., LL.D.
Glossop	Ball, John
Gloucester	Fryer, K. H.
Grantham	Ekin, Thomas
Gravesend	Sharland, George
Great Grimsby	Daubeney, N. H.
Greenock	Hill, Ninian, M.D.
	Macnaughten, P.
Guildford	Haydon, S.
Halifax	Crosley, Frank
	Carter, Richard
	Brown, William
Hartlepool	Belk, Thomas
Hastings	Rock, James, jun.
Hayle	West, W.
Helston	Hill, Frederick
Hereford	Johnson, Richard
Hertford	Longmore, P.
Honiton	Devenisle, Samuel
Huddersfield	Greenwood, F.
	Shaw, Joseph
	Laycock, J. C.
Hull	Jacobs, Bethell
	Frost, Horace
Ipswich	Notcutt, S. A.
Isle of Wight	Eldridge, James
Kendal	Gandy, Gerard
Kensington	Morris, John
Kidderminster	Hallen, Thomas
Kilmarnock	Wilson, James
	Brown, Alexander
Kirkcaldy	Sang, William
Lancaster	Dunn, W.
Launceston	Gurney, Charles
Leamington	Hanbury, J. B.
Leeds	Wilson, Thomas
	Kitson, James
	Cawood, Martin
Leicester	Stone, S.
	Wheeler, S. H.
Lewes	Lower, M. A.
Lichfield	Lomax, T. G.

Name of Town.	Sec. of Committee.
Limerick	Boyse, John
Lincoln	Major, R.
Liskeard	Jago, James
Liverpool	Grantham, John
Llanelly	Thomas, John
London	Catley, Rev. S. R.
	Wire, D. W.
Louth (Lincoln)	Ingoldsby, C.
Macclesfield	Higginbotham, S.
Maidstone	Mercer, John
Manchester	Fleming, Hugh
Merthyr Tydvil	Wolrige, J. C.
Middlesborough	Gitkes, Edgar
	Fallowes, W.
Montreal (Canada)	Leming, John
	Lyman, Henry
Montrose	Myers, G. C.
Newcstl.-und-Lyne	Mayer, T. W.
Newcastl.-on-Tyne	Wotsoh, Joseph
	Burnett, Thomas
Newport (Monmth)	Latch, Thomas
Northallerton	Jefferson, W. T.
Northampton	Rands, G., jun.
Norwich	Leman, R.
	Willett, Henry
Nottingham	Enfield, William
	Rawson, George
	Butler, Rev. W. J.
Oldham	Radcliffe, Henry
Oxford	WalkerRev.R.,M.A.
	Spiers, Richard J.
	Plowman, Joseph
Paisley	Martin & Hodge
Penzance	Pearce, Richard
Perth	Reid, Archibald
	Greig, William
Plymouth	Arthur, Oswald C.
Poole	Welch, Martin K.
Portsmouth	Deacon, Henry
	Howard, John
Preston	Cartwright, S.
Putney and Roehampton	Fulton, H. H.
Ramsgate	Burgess, George
Redruth	Peters, John L.
Reigate	Martin, Peter
Richmond (Surrey)	Chapman, William
Richmond (Yorksh)	Cooke, Leonard
Ripon	Nicholson, R. W.
Rochester	Prael, R.
Rotherham	Barraz, John
Runcorn	Simpson, John
Rye	Dawes, E. N.
Scarborough	Moody, J. J. P.
Sheerness	Keddell, J. S.
Sheffield	Plimsoll, Samuel
Shrewsbury	Pidgeon, Henry
Southampton	Deacon, C. E.
Southport	Lewis, Richard
South Shields	Elliott, Robinson
	Stevenson, A.
Stafford	Turnock, James
Stamford	French, William
St. Austell	Drew, J. H.
St. Columb	Collins, G. B.
St. Helen's	Fincham, Fred.
Stirling	Boyd, A.
	Morrison, P. G.
Stoke-upon-Trent	Battam, Thomas
Stourbridge	Gibson, G. W.
Stroud	Freston, W. A.
Stockport	Vaughan, John
Stockton	Crosby, John
	Laing, Joseph
Sunderland	Candlish, John
	Snowball, William
Swansea	Francis, G. G.
Tamworth	Thompson, J.
Taunton	White, Eales
Tewkesbury	Thomas, Joshua
Tower Hamlets	Humphreys, John
Truro	Simmons, G. N.
Uttoxeter	Beadon, Thomas
Wakefield	Witham, James
Walsall	Newman, J. W.
Warrington	Marsh, J. Fitchett
Warwick	Tibbits, James
Waterford	Nevins, Hugh N.
Wellington (Salop)	Benson, J.
Westminster	Drew, G. H.
Wexford	Dillon, Rev. E., M.R.I A.
Whitby	Cramp, W. H.
	Belcher, Henry
Whitehaven	Armitstead, R.
Wigan	Acton, Thomas
Winchester	Bailey, Charles
Windsor	Voules, Charles S.
Wolverhampton	Walker, Thomas
Worcester	Webb, Edward
Yarmouth, Great	Palmer, C. J.
Yeovil	Batten, J., jun.
York	Munby, Joseph
	Richardson, H.

We sincerely trust that the exhibition thus announced will, as we cannot for a moment doubt, be carried out with that spirit, regard to justice, and impartiality, which would appear to be the guiding rule observed by the Executive Committee ; while it would be to us, as to every Englishman, a source of regret, if so truly great a design, reflecting the highest honour on the illustrious prince with whom it has emanated, should be in any

way marred by those petty jealousies or obstacles which are too frequently put forward by parties who possess not a mind whose basis is liberality and universality of feeling; but of this we augur no apprehensions need arise, were it only the merit due to his royal highness Prince Albert, for thus originating so noble an institute, worthy as it is of the support of the English nation. The Executive Committee have imposed upon themselves an important duty, and must be held responsible, not only to England but to the whole world—they have the power placed in their hands, if wisely and temperately used, of strengthening the generous rivalry of industry between nations, and thereby securing the bonds of amity and peace; while after ages will hail the present era as that which seized on and availed itself of the first and greatest step to render all mankind brothers, and create that peace and concord, which it is our fondest hope may be found to reign over the earth.

PATENT

TOUGHENED CAST IRON AND MALLEABLE IRON.

THE Report of the Commissioners appointed to inquire into the application of iron to railway structures, published in July last, is a document of the utmost importance to engineers, and to all persons connected with the construction of massive iron structures, more particularly where firmness and strength are required. From the general results of the evidence adduced, the Commissioners are of opinion that any legislative enactments with respect to the forms and proportions of iron castings employed in such structures would be highly inexpedient; and among the recommendations with which they close their report, the necessity is particularly impressed on the minds of engineers, that in contracting for large castings they should stipulate for iron to bear a certain weight. As it is most important to all engineers and architects having to employ iron in the form of girders, beams, &c., for fire-proof buildings and other erections, where lightness, combined with strength, is a desideratum, to know that Mr. Stirling's iron, in round numbers, is double the strength of common irons, and from 40 to 50 per cent. stronger than the very best, it is our intention here to record a few of the experiments, the results of which furnished the evidence before the Commissioners. In these times, when engineers are obliged to use every means to execute their works as cheaply as possible, the diminished weight of material is of the first importance.

Mr. Eaton Hodgkinson, in his experiments for the commission, found

that bars ten feet long and two inches square, with the supports nine feet apart, broke as follows :—

	lb.
Blaenavon iron, No. 2	1,220
Low Moor iron, No. 1	1,207
Bars cast at Warrington, composed of Madely Wood, 8; Lilleshall, 6; Pontypool, 3½; and charcoal iron, 5 parts..	1,375
Stirling's second quality, composed of Calder hot-blast No. 1, with 20 per cent. of malleable scrap	2,174

This iron is termed second quality, because a still stronger mixture, more especially adapted for large castings, is produced by employing a No. 3 iron with the requisite proportion of malleable scrap. In a series of experiments made at the Dundyvan works, and described at page 416 of the report, the strength of bars of this mixture, of the same size as the foregoing, is shown to be much greater, the breaking weight being 2,601 lb. We may here remark how nearly Mr. Hodgkinson's experiments correspond with those made at Dundyvan, as the two series on *No.* 1 *patent toughened iron* will show :—

	lb.
Hodgkinson	2,174
Dundyvan	2,152
Ditto	2,234

The opinions expressed in the report by Mr. Fairbairn, Mr. May, Mr. Thomas Cubitt, and several other of the witnesses examined, who have made themselves acquainted with the patent iron, are highly satisfactory and fully conclusive as to its great superiority.

At page 9 are found the results of some experiments, by Mr. Hodgkinson, on the tensile strength of the same iron, to be above twelve tons per square inch; the average of seventeen other descriptions of iron experimented on having given between six and seven tons, thus showing that Mr. Stirling's iron is nearly 100 per cent. stronger than the average. The kind of iron called Stirling's third quality, employed in these experiments, contained cinder, and, although stronger than any other iron experimented on by Mr. Hodgkinson, is not recommended by Mr. Stirling, and is not now made. Written communications have been received from the managers of large bar-iron works, stating that the toughened iron is found exceedingly well adapted for all the heavy bar-iron work machinery employed in the iron manufacture. Rolls and pinions cast from it are much sounder and stronger than those made from any other iron. Pinions especially give great satisfaction, as they stand the wear and tear of working much longer, and as the stoppage of the machinery, which, under general circumstances, so frequently takes place, is thus avoided. Much advantage is also obtained by using this iron in the construction of cast girders, as *much greater strength is obtained, with a large saving in weight.* At page 101 an abstract is given, showing the crushing strength per square inch, in which we also find Mr. Stirling's iron to be nearly 50 per cent. superior in strength to sixteen other sorts of iron experimented on. Had Mr. Stirling's No. 3, or 3 extra iron, been submitted to the same tests, the resistance to crushing force would have been very much greater.

At page 417 an abstract is given of a number of experiments made on

the comparative strength of Stirling's patent and common malleable irons, from which we extract the following :—

	Breaking strain in Tons per Square Inch.
Average given by Mr. Jesse Hartley from experiments at Liverpool on many sorts of malleable iron	23·23
Average of S. C. Crown iron, as used and regularly tried at Woolwich dockyard	24·47
Average best Dundyvan bar	24·33
Average Mr. Stirling's best quality	27·81
Average " another "	27·07

Attention must be called to some varieties of the patent iron, which are remarkable for their extreme stiffness, both tensilely and transversely, which are recommended to form the wearing surfaces of rails, tires, &c., and for all purposes where such qualities as stiffness and toughness are desirable. We have ourselves seen fractured specimens of rails, formed of common iron for the body, and the patent hardened iron for the wearing surface, in which the hard crystalline character of the latter gives decisive evidence of its high power to resist compression, lamination, and abrasion.

The average stretch of malleable iron, in two-feet lengths of round bars 1 inch diameter, may be taken at from 3 to 5 *inches*, or from the table before us, $4\frac{1}{8}$ *inches*, while the average of Mr. Stirling's hardened malleable irons is for one kind $\frac{3}{4}$ *inch*, and for the other $\frac{1}{4}$ *inch*, in the permanent set of the same-sized bar, as before described, of common iron when loaded, so as to show its resistance to transverse strain may be taken at 2·12 inches, while that of one variety of the hardened iron is 1·02 inches.

The iron bridge across the Thames, at Windsor, now constructing by Mr. Page, and the cast portion of the bridge erecting at Yarmouth, by Mr. James Walker, are of Mr. Stirling's patent toughened cast iron.

MISCELLANEA.

MINERALOGY.

Composition and Uses of Anthracite.—Anthracite consists of carbon in considerable quantities, with a small proportion of silica; there are several varieties, the principal of which are massive, slaty, and columnar; the massive is of an iron-black colour, occasionally with a splendent metallic lustre—it burns without flame or odour, leaving a white ash. The slaty is of a brownish-black colour, easily frangible, somewhat sectile and brittle; vast deposits of it exist in the United States, the most celebrated of which is the anthracite region, as it is called, of the Susquehanna, in Pennsylvania; it is between sixty and seventy miles long, and about five broad, constituting a trough or elongated basin through which the Susquehanna river and

Lackawanna creek flow. In England it is found near Walsall, in Wales in the southern parts of Brecknockshire, Carmarthenshire, and Pembrokeshire, near Cumnock and Kilmarnock in Scotland, and at Kilkenny in Ireland. The columnar occurs in prismatic concretions, either straight or curved—it burns without flame or smoke. It is principally found at the Meisner in Hesse, forming the upper portion of a bed of brown coal, which is covered by basalt. In Ayrshire, and some of the Newcastle pits, it occurs in contact with dykes of greenstone—at the former frequently passing into plumbago. Being more difficultly inflammable than bituminous coal, it is principally used in limekilns, maltkilns, iron foundries, &c. When ignited in considerable quantities, it burns with a strong and durable heat; much of the difficulty of kindling may be overcome by the addition of a little charcoal, and the proper application of a current of air. In the northern states of America, where common coal is little known, this forms the principal fuel of the maritime cities, and is there in general use for every purpose of raising temperature. At Freyberg in Saxony, and elsewhere, it is used instead of charcoal in the refining of copper. Mineral carbon, or mineral charcoal, is nearly allied to it; this occurs in thin layers and fibrous concretions of a delicate silky black colour, in most of the coal-fields of Great Britain, at Voitsberg in Styria, Disko Island, Greenland, and elsewhere.

JET.—Pitch coal, or jet, is generally of a velvet black; it occurs in elongated reniform masses, and sometimes in the shape of branches, with a regular woody structure; this is visible internally only by transmitted light, and in specimens cut extremely thin; it has then a brown translucent appearance. It presents a brilliant resinous lustre; and a perfect conchoidal fracture; is soft and brittle, and little heavier than water; burns with a greenish flame and strong bituminous smell, leaving a yellowish ash. Jet occurs principally in marly, schistose, or sandy beds, in several places in France, where it is sometimes found enclosing amber, and near Wittemberg in Prussia, and in detached fragments in the amber mines on the coasts of the Baltic. In England it occurs in aluminous shale, at Whitby in Yorkshire. It is worked into various trinkets, chiefly used for mourning, but when not sufficiently fine and hard for that purpose, it is used as fuel. Cannel coal receives a polish, and is occasionally made into snuff-boxes, inkstands, &c.

RED SILVER.—This beautiful mineral is confined to a small number of localities, though in some of them it is of pretty frequent occurrence. The light red varieties are met with principally in the Saxon and Bohemian districts of the Erzgebirge, particularly at Marienburg, Annaberg, and Johangeorgenstadt in Saxony, and Joachimsthal in Bohemia. It is usually associated with other ores of silver, galena, blende, pyrites, and arsenic. The dark red varieties occur chiefly with calcareous spar, native arsenic, and galena, at Andreasberg (in the Hartz), Freiberg (in Saxony), Schemnitz and Nagybanya (in Hungary), Guadalcanal (in Spain), Kongsberg (in Norway), and St. Maire aux Mines (in France). It was formerly found at Huel Duchy in Cornwall, and from some of the Mexican mines vast quantities have been obtained. Red silver, from its colour, may sometimes be mistaken for red orpiment; but the yellow streak of the latter is well defined, and its specific gravity lower. Cinnabar volatilizes before the blowpipe, while red silver forms a metallic globule. As an ore, it has been observed that the dark yield a larger proportion of silver than the light—that from Joachinsthal contained sulphuret of silver, 74·35, sulphuret of arsenic, 25·00.

FLEXIBLE SULPHURET OF SILVER.—This rare mineral has hitherto been met with only in Hungary, and at Freyberg in Saxony, and even at those localities in a very small quantity. It consists of silver, sulphur, and a little iron. It is externally of a dark colour, approaching to black. It

occurs both massive and in small tubular crystals, which appear to be right oblique-angled prisms, the lateral planes of which are alternately 125° and 55°. Flexible when in thin laminæ, and readily separated into them. Cleavage parallel with the terminal planes, very soft, and yields readily to the knife. Lustre metallic, but less brilliant than that of sulphuret of silver.

CINNAMON STONE.—This is a combination of silicate of alumina, silicate of lime, and silicate of the peroxide of iron; it commonly occurs in masses, which are full of fissures. Its general colour is red, with occasionally a brown or orange-yellow tinge, translucent, rarely transparent, fracture flat conchoidal, lustre vitreo-resinous, scratches quartz with difficulty. Before the blow-pipe it is fusible with ebullition into a darkish green glass, and with borax melts very readily into a transparent glass, more or less feebly tinged by iron. It has been found in considerable masses in some of the primitive rocks of Ceylon, and embedded in limestone at Malsjo in Sweden, but is most commonly met with in grains among the sand of certain rivers, both in Ceylon and in Brazil. The Romanzovite of Nordenskjold, which occurs at Kimito in Finland, is considered a variety of cinnamon stone.

VANADIUM.—This scarce mineral was discovered during the year 1830, by M. Serstrom, in a Swedish iron remarkable for its ductility. It is the produce of the iron-mine at Taberg, not far from Jönköping. It exists also in an ore of lead which occurs at Zimipan in Mexico, which was analyzed in 1801 by Del Rio, who stated that it contained a new metal, which he denominated erythronium. It was subsequently found that the new metal was chromium. M. Sefstrom extracted vanadium from the scoriæ of the Taberg iron, which he found richer in that metal than the iron itself.

IODINE.—Though non-metallic, this is considered a mineral substance. It exists in sea-water, and in the water of several natural springs. It was discovered in 1812, by M. Courtois, of Paris. It is found in shining scales, having the lustre of steel, or micaceous iron ore, the specific gravity of which is 4·948. At 225° Fahr. it fuses, and at 347° forms a rich violet-coloured vapour. It forms acids with oxygen, hydrogen, and chlorine; but it is a very rare production of nature.

METEORIC STONES.—The first of which we have any accurate account fell on Wednesday, the 7th of November, 1492, at Ensisheim, near Basle, on the Rhone. Its fall to the earth was accompanied by a loud clap of thunder; its noise was heard at Lucerne and several other places. It weighed 255 lbs. It was considered so great a curiosity, that it was ordered by the emperor Maximilian to be pierced and hung in the church. A very large stone, which was observed to fall from the atmosphere in the year 1751, in Croatia, is preserved in the Museum of Vienna. One of 1,600 lbs. weight was discovered by Professor Pallas in Siberia; this, however, is greatly exceeded by the one mentioned by Don Rubin de Celis, as lying on the plains of Peru, which he calculated to be of the enormous weight of 15 tons. Meteoric iron has been imitated by alloying nickel with native iron, in the proportion of 90 iron to 10 of nickel.

KUPFERSCHAUM.—This is a combination of oxide of copper, arsenic acid, water, and carbonate of lime. The primary form is a right rhombic prism; it occurs in rhomboidal plates, which present perfect cleavage, parallel to the faces of the rhomb. It is generally found in small aggregated and diverging fibrous groups, of a pale apple-green, or verdigris-green colour, inclining to sky-blue, and translucent. Before the blowpipe, it fuses readily in the platina forceps into a pebbly copper red scoria. Upon charcoal it intermixes, disengages an argillaceous odour, and melts into a green scoria, containing numerous grains of metallic copper. With borax it forms a green limpid glass, and with soda is reduced. It is found disposed in the cavities of calamine, associated with barytes, calc, spar, or

quartz, in the Bannat, at Libethen in Hungary, Nerzschinsk in Siberia, Schwartz in the Tyrol, Saalfeld in Thuringia, and Matlock in Derbyshire.

LAPIS-LAZULI.—Lapis-lazuli is composed of silica 49·0, alumina 11·0, lime 16·0, soda and potash 8·0, oxide of iron 4·0, magnesia 2·0, sulphuric acid 2·0. Its specific gravity is 2·95. It is found massive; sometimes, but rarely, in rhombic dodecahedrons of an azure-blue colour. The texture of the massive is fine-grained, or compact, with a glimmering lustre, and is hard enough to scratch glass, though it scarcely gives sparks with steel. It is nearly opaque; its blue colour is not uniform, as it frequently encloses iron pyrites, compact felspar, and quartz. On charcoal it fuses with difficulty into a white glass, when pure; with salt of phosphorus it is soluble, with effervescence, the portion melted burning with great brilliancy; with soda it is partly soluble into an opaque greenish-grey glass, which assumes a red appearance on cooling; and, if previously calcined and reduced to powder, loses its colour in acid. The finest specimens are brought from China, Persia, Lake Baikal in Siberia, and Bucharia. Lapis-lazuli is highly esteemed by the lapidary, but is chiefly important as affording the beautiful pigment ultra-marine, so highly valued by painters.

SOAPSTONE.—Potstone, steatite, and soapstone are of the same family. The soapstone of Cornwall is found massive and nearly white, or of a grey colour, sometimes with a tinge of yellow, and mottled with green and purple. When first raised, it may be kneaded like dough, but on exposure loses part of its moisture, and is then translucent on the edges, yielding to the nail, and possessing an unctuous feel. Steatite is found in considerable masses, in beds or veins. The Arabs are said to use it, instead of soap, to soften the skin; and Humboldt states that the Otomaques, a savage race inhabiting the banks of the Oronoko, are almost entirely supported, during three months of the year, by eating a species of steatite, which they first slightly bake, and then moisten with water. The whiter varieties are used in the manufacture of porcelain; others are used for fulling. Potstone is a coarse indistinctly granular variety of indurated talc, having a greenish-grey or leek-green colour, with a glistening or pearly lustre. It is found at Chiavenna in the Valteline, at Como in Lombardy, and, generally speaking, in serpentine countries; in Norway, Sweden, Finland, and Greenland. Its united properties of infusibility, softness, and tenacity, admit of its being readily turned on the lathe. From time immemorial it has been formed into vessels in the Valais and Grisons; and Pliny describes it as being used in this manner in his time. It is extensively employed in Norway and Sweden for the construction of furnaces and stoves for domestic purposes.

INTRODUCTION OF PLATINA INTO ENGLAND.—Platina was first called by the Spaniards "plata de pinto." It was brought into England by Mr. Charles Wood, in the year 1746. He obtained it in Jamaica, from a Spaniard, who brought it from Carthagena in New Spain. Its principal deposits are in Brazil and Siberia.

GRAPHITE.—Although this mineral is commonly called blacklead, it contains no particle. It is mineralogically known under the name of plumbago. It contains a considerable quantity of carbon, with a small proportion of iron; that of Cornwall consists of 96 carbon, 4 iron; its colour is iron or steel-grey. It has a glistening metallic lustre, a granular and uneven texture, is unctuous to the touch, sectile, and the thin laminæ very flexible, not very brittle, with a shining lead colour streak. Before the blowpipe it becomes yellow or brown, after long-continued heat, but is infusible, nor is it affected by the addition of any reagent. It belongs chiefly to primitive rocks and the coal formation. The purest and most esteemed plumbago is found at Borrowdale in Cumberland, where it occurs in rocks consisting chiefly of grauwacke, and whence it is obtained in considerable quantities for the manufacture of pencils. It occurs likewise at

Pargos in Finland, in Greenland, in the United States, in Norway, in Ceylon, and many other places. In addition to its being extensively used in the manufacture of pencils, graphite is employed in the fabrication of crucibles, particularly those required for the purposes of the mint, as they sustain intense heat, and are esteemed for their tenacity and expansibility. It is also used to diminish the friction of machinery, and to protect iron from oxidation.

DOLOMITE.—This is generally called magnesian limestone. It occurs massive, and has sometimes a slaty texture; it consists of fine crystalline grains, which are lamellar; is generally white, occasionally with a tinge of yellow or grey; is translucent on the edges, and when struck frequently, emits a phosphorescent light, which is visible in the dark. It greatly resembles primitive limestone, but is readily distinguished by its feeble effervescence in acid. It occurs in the Pyrenees, Saxony, France, Sweden, Iona, and in an impure state in many counties of England—Somersetshire, Yorkshire, &c. Near Sunderland it forms globular, earthy-like, concretions; in the same vicinity it is found in slaty masses, which, when split in thin pieces, are very flexible—a quality supposed to depend on the water it contains, as it is nearly lost when the mineral dries. Gurhofion, which is a variety, is of a snow-white colour, and very compact; the fragments, which are sharp, are translucent on the edges—fracture flat conchoidal. It is often taken for semi-opal. It occurs in veins traversing serpentine, between Gurhof and Aggsbach, in Lower Austria. The mortar obtained from this species is esteemed for cement, being less subject to decay, owing to its absorbing less carbonic acid from the atmosphere than common limestone. For agricultural purposes it is of inferior value; when laid on particular soils, it tends to injure rather than improve vegetation—this effect is owing to the magnesia it contains. The cathedral of Milan, the Minster and city walls of York, are built of magnesian limestone; the white marble of Paros, and that of Iona, in the Hebrides, belong to this species; it, therefore, often admits, as well as limestone, of being cut and polished, and is supposed to be particularly durable.

SULPHATE OF URANIUM.—Johannite, or hydrous sulphate of uranium, mixed with sulphate of copper, occurs in extremely small crystals, in Joachimsthal in Bohemia. It is a species as beautiful as it is rare, having only been observed in one mine, and that in 1809. Its colour is deep grass-green, translucent; lustre vitreous; streak pale siskin-green; taste slightly bitter; fracture imperfect conchoidal; partially soluble in water. Heated in the matrass, it yields much moisture, leaving a dark brownish mass; fused upon charcoal with soda, and then laid on a piece of silver and moistened, it blackens the metallic surface. In the reducing flame, with soda, a bead of copper is obtained. With borax, it forms a fine green glass, as well in the oxidating as in the reducing flame; in the latter it becomes red and opaque on cooling, exhibiting the presence of oxide of copper. With salt of phosphorus, only green colours are produced, that of the oxidating flame having rather the appearance of copper, the reducing more of uranium. It therefore contains water, sulphuric acid, and the oxides of copper and uranium, but in what proportions has not been determined. It was named by the celebrated chemist, Haidinger, in compliment to his imperial highness the Archduke John of Austria, the late vicar of the German empire.

MECHANICS.

Early Accounts of the Steam Engine.—Capt. Savery, a Cornish miner, was the first who contrived a steam-engine of practical utility; he, however, borrowed the idea from the *Century of Inventions*, written by the Marquis of Worcester; but, anxious to conceal the obligation, he purchased and destroyed all the copies he could find. Newcome, an ironmonger, and Cawley, a glazier, followed in his track. Humphrey Potter was the next. A story is related of him, that, when a boy, having to turn the cocks upon which the working of the engine depended, he one day observed, in the agony of his anxiety to join his companions at play, a method of attaching the cords which would make the engine perform his office for itself. This, however, has been discovered by competent authorities, and who all agree that the effect of his improvements was solely to increase the working speed. It was at that period a complex machine, with a diversity of catches and strings, which the great Watt simplified, and laid the foundation of the gigantic improvements which have taken place in the present century. The first successful engine which operated by means of a cylinder and piston was contrived by Thomas Newcomen, an ironmonger of Dartmouth, and John Cawley, a glazier of the same place, about the year 1710. This engine, as first constructed, was provided with a casing around the cylinder, for holding cold water, to accelerate the condensation of the steam, and the surface of the piston was covered with water, to prevent the passage of air through it. The steam was admitted from the boiler by a slide valve, or regulator, which was moved by hand, and after the cylinder was filled with steam, water was introduced into the external casing, by which, in process of time, the steam was condensed, and the piston made a stroke. This was, however, tedious work, and the engine was very untractable, until the method of condensing the steam by a jet of cold water was introduced, and the movement of the valves was effected by the engine. The improvements were the effect of accident, and the mode of their development is thus related by Desaguliers:—"In the latter part of the year 1711, Newcomen and Cawley made proposals to drain the water of a colliery at Griff, in Warwickshire, where the proprietors employed 500 horses, at an expense of £9,000 a year; but their invention not meeting with the reception they anticipated, in March following, through the acquaintance of Mr. Potter, of Bromsgrove, in Worcestershire, they bargained to draw water for Mr. Back, of Wolverhampton, where, after a great many laborious attempts, they did make the engine work; but not being either philosophers to understand the reason, or mathematicians enough to calculate the powers and proportions of the parts, they very luckily by accident found out what they sought for. They were at a loss about the pumps, but being so near Birmingham, and having the assistance of so many admirable and ingenious workmen, they came, about 1712, to the method of making the pump-valves, clacks, and buckets, whereas they had but an imperfect notion of them before. One thing is very remarkable; as they at first were working, they were surprised to see the engine go several strokes, and very quick together; when after a search they found a hole in the piston, which let the cold water in to condense the steam in the inside of the cylinder, whereas before they had always done it on the outside. They used before to work with a buoy to the cylinder, enclosed in a pipe, which buoy rose when the steam was strong, and opened the injection valve, and made a stroke; thereby they were capable of giving only six, eight, or ten strokes in a minute, till a boy named Humphrey Potter, in 1713, who attended the engine, added (what he called *scoggan*) a

catch that the beam always opened, and then it would go fifteen or sixteen strokes per minute. But this being perplexed with catches and strings, Mr. Henry Beighton, in an engine he had built at Newcastle-upon-Tyne, in 1718, took them all away but the beam itself, and supplied them in a much better manner."

Difference of Railway Gauges.—The broad gauge is 7 feet, the Irish gauge 5 feet 3 inches, and the narrow gauge 4 feet $8\frac{1}{2}$ inches. The first locomotive in 1824 travelled at a rate of six miles an hour; in 1829, the *Rocket* attained a speed of fifteen miles an hour; in 1834, the speed of the *Fire Fly* was twenty miles an hour; in 1839, the *North Star* had progressed to thirty-seven miles an hour; at this present time locomotives move with a velocity of seventy miles an hour. Since the first introduction of railways, the quantity of fuel required for generating steam has been reduced five-sixths—that is, one ton of coal is consumed now, where formerly six were necessary.

Early Use of Railways.—The first wooden railway was employed at Newcastle, in 1680, for transporting coals from the pits to the river Tyne, upon which duty, even at that time, there were employed from 400 to 500 carts. Slips of ground, of the requisite breadth for the railway, were marked out between the coal-pits and the river, and were either leased by the coal owners, or purchased of the different proprietors whose ground the proposed line of road intersected in its course. To obtain the most easy and regular descent, this line was varied in its direction, to meet the inequalities of the ground; or where these inequalities were inconsiderable, it was carried straight forward, and the regular slope made by embankments and cutting. The ground being then smoothed and levelled, large logs of wood, called sleepers, cut in equal lengths to the breadth of the road, were laid across it, and firmly bedded into it at short distances, to sustain and hold fast the rails, or slips of wood on which the waggon wheels were intended to run. These rails were made of beech, and were laid end to end, so as to form two continued lines of rails or wooden ridges, running parallel to each other, along each side of the road, crossing the large logs on each side of their extremities, on which they rested, as on so many foundations. The waggons were of the usual construction, but of a larger size, so as to contain several tons of coals, and set upon low wheels—the smoothness of the way rendering wheels of the ordinary size unnecessary. Where any steep declivity occurred on the road, this was called a run, or inclined plane, and on it the descent was retarded and regulated by a species of break, or crooked lever, termed a convoy, attached to the waggon and managed by the driver. The banks of the Tyne, near Newcastle, on each side are remarkably steep, but, instead of forming inclined planes on them, the railway was continued on a wooden stage, raised to the same height as the top bank of the river, and carried forward until it came perpendicularly over the river side, where a wooden platform, termed a staith, was erected, for the convenience of delivering the coals—the waggons being emptied into a trough, or spout, down which the coals descended, either directly into the ships, or the store below.

Production of Power by Steam.—According to Mr. Craddock, to produce 95-horse power gross with steam, at 115 lbs. per square inch, it would require 1,736 lbs. of steam per hour, or 217 lbs. of coals; without expansion, at 18 lbs. per square inch, it would require 4,030 lbs. of steam per hour, or 504 lbs. of coal; without condensation or expansion, at 40 lbs. per square inch, it required 5,270 lbs. of steam per hour, or 690 lbs. of coals. The atmosphere is included in all the above pressures.

Steam-Vessels on the Mississippi.—In the vessels which ply on the Mississippi, the paddles are made with a clutch, or friction-strap, so that they may be thrown out of gear, and the engines may be turned, so as to feed the boilers, when the vessel is alongside a wharf, without moving the

paddle-wheels. The steam-vessels plying on the Mississippi are chiefly built at Pittsburg and Cincinnati.

COMPETITION OF LOCOMOTIVES.—The average of 12 trips, of 24¾ miles, up 1 in 440, on the Grand Junction Railway, with six engines—three made by Robert Stephenson & Co., and three by Sharpe, Roberts, & Co.—was 23¾ miles per hour, with a weight of 58 tons. The coke consumed was 864 lbs., and the steam power 48 lbs. per square inch. The engine, No. 7, on the London and Birmingham line, built by Mr. Bury, of Liverpool, went 10 miles in 10 minutes, on the 3rd October, 1838, with only one cylinder working—viz.: from Hampton to Birmingham, being 4⅓ miles up 1 in 660, 3½ miles 1 in 1,370; rest of the way was level, and the time included the getting up and slacking down the speed.

ANCIENT FLYING SHIP.—Aerial navigation by means of vessels is not a modern idea. In the 56th No. of the *Evening Post*, Dec. 22, 1709, a description and diagram of a flying ship is given, invented by a priest of Brazil, Bartholomew Laurent. In his address to the king of Portugal, whom he prays for a patent, he states, "that by it one may travel 200 miles in 24 hours, carry orders to generals in remote countries, as also letters, recruits, provisions, ammunition, and money; supplying besieged places with all necessaries, and transporting merchandise through the air." This vessel, which was built with a square stern and figure-head, was to have her sails drawn from stem to stern, in the form of a semicircle. In the bottom of the vessel were bellows, to propel her when the wind was slack. From each side of the keel were huge wings to steady her, and the rudder was moveable. Between the sails and the deck was a cover, made of iron, in the form of a net, on which were fastened a quantity of amber beads, which, by some secret virtue, were to keep the ship afloat. At each end of the vessel were to be placed the celestial and terrestrial globes; these were of metal, and contained in them two loadstones, which were to draw, by their attraction, the ship after them, which was constructed of thin iron plate.

STEAM-ENGINES OF THE ROYAL NAVY.—The following table, compiled from the list of the steamers in the navy, is given in Messrs. Main and Brown's work on the marine engine.

Name of firm.	Pad. wh. h.p.	Screw h.p.	Total h.p.
Seaward & Co.	5,790	1,920	7,710
Maudslay & Co.	5,520	1,510	7,030
Boulton & Watt	3,365	—	3,365
Miller & Ravenhill	1,531	1,222	2,753
Penn & Co.	1,890	748	2,638
Messrs. Rennie	2,017	150	2,167
R. Napier	1,475	580	2,055
Fairbairn	1,890	—	1,890
Fawcett	1,824	—	1,824
Forrester	910	—	910
Scott & Sinclair	760	—	760
Rigby	515	—	515
Butterly & Co	280	—	280
Caird & Co.	240	—	240
Coates	144	—	144
Total	28,151	6,130	34,281

The value of this machinery, at £50 per horse-power, would be £1,714,050.

CHEMISTRY.

Antiquity of Chemistry.—The early history of chemistry is involved in darkness. The writings of the alchemists carry it up to the most remote antiquity, though nothing has been said satisfactorily as to the origin of their craft. Borrichus, and later authors, who felt that many of the processes of the artificers were dependent upon chemical agencies, thence inferred that they were the result of chemical knowledge. On these grounds, Tubal Cain, the first artificer in iron and brass, has been considered the father of metallurgical chemistry. There is also a story in Vossius, which was believed by Tertullian, that the knowledge of chemical principles was among the gifts bestowed by the angels who were led from heaven by the beauty of the daughters of the earth. Others, more moderate, deem Noah the first chemist, because he is said to have discovered the art of making wine. Du Fresnoy, in his "Histoire de la Philosoph. Herm.," says that it was bequeathed to Ham and his descendants as a heritage. The Egyptians, among the nations of antiquity, appear to have possessed the greatest amount of chemical knowledge. They prepared sal ammoniac, common salt, vitriol, glass, enamel, tiles, painted earthenware, several metal and metallic alloys, soap, vinegar, beer, various medicines and pigments, and knew how to fix colours on silk by means of mordants. Whether the Chinese, who have long been acquainted with the preparation of sulphur, nitre, gunpowder, borax, alum, porcelain, verdigris, paper, together with dyeing, and the formation of various metallic alloys, are partly indebted to the Egyptians for their knowledge, is a question which must remain undecided.

Experiments with Muriate of Titanite.—A slender stick of tin being placed in a solution of the muriate of titanite, the solution becomes first rose, then ruby red, and then of an amethystine hue. Zinc thus produces first a violet, and then a deep indigo blue. The prussiate of potash produces a green precipitate from the muriate of titanium; and if an alkali be added while it remains with the same fluid, it passes through beautiful tints of purple and blue, becoming at the end white.

Fulminating Gold.—The ammoniacal oxide of gold, or fulminating gold, is formed from a nitro-muriatic solution, mixed with three or four times its weight of distilled water, by the addition of ammonia, until the precipitation is completed, but not beyond that point. The precipitate, which will weigh about a fourth more than the gold, is to be carefully washed and dried on paper. It is also formed whenever ammonia is introduced in any manner into the solution, and a precipitation is effected by any alkali. This precipitate explodes with a considerable noise by the application of a slight degree of heat, or by pressure, or by percussion. The fulmination results from the sudden and violent disengagement as well as condensation of the hydrogen of the ammonia and oxygen of the oxide, whilst uniting to form water, and the rapid escape of the nitrogen, the gold being left restored to its metallic form.

Fulminating Silver.—Ammoniacal oxide of silver, or fulminating silver, is obtained by the following process:—Nitrate of silver, being precipitated from its solution by lime, and placed on filtering-paper, to separate it from the moisture, is then to have a small portion of liquid ammonia poured on it. The mixture having remained 10 or 12 hours, if a bright pellicle appears, more ammonia is to be added. The fluid is afterwards to be decanted from the black precipitate, and evaporated in a retort, when it will become full of opaque crystals of a metallic appearance, which fulminate

on being touched, even under water. Both these crystals and the precipitate exceed in power gunpowder, and even fulminating gold. Fulminating silver, once thus obtained, can no longer be touched without a violent detonation, no more than one grain being sufficient to give rise to a dangerous fulmination. After this fulmination, the silver is found reduced, or revivified—its oxygen having combined with the hydrogen of the ammonia, by which water, in the state of vapour, is produced. This water, instantly vaporized, and possessing all the elasticity and expansive force of that state, is the principal cause of the phenomenon, in which the nitrogen of the ammonia, with its whole expansibility, bears a part.

Fulminating Mercury.—Fulminating mercury may be obtained by the following process:—100 grains of quicksilver, dissolved with heat, in a measured $1\frac{1}{2}$ ounce of nitric acid of 1·3 specific gravity, and being poured cold upon 2 measured ounces of alcohol of about 849, and a moderate heat applied, a powder precipitates, which is to be immediately washed on a filter, and dried with a heat little exceeding that of a water-bath. This powder takes fire at 368 Fahr.; it explodes by friction, by flint and steel, and by being thrown into concentrated sulphuric acid. It is equally inflammable under an exhausted receiver, as surrounded by air, and it detonates loudly either by the blow of a hammer or by a strong electrical shock. It appears to be composed of the nitreous etherized gas and of oxalate of mercury, with excess of oxygen.

Variation of Gas in Coal.—When decomposition is effected on the large scale, the quantity of gas is found to vary with the quality of the coal, and the manner in which the operation is conducted. According to Mr. Peckstone, a chaldron of Newcastle Wall's-End coal yields 10,000 cubic feet, being at the rate of $370\frac{1}{3}$ cubic feet per cwt. At Edinburgh, a cwt. of Cannel coal yields 430 feet, and a similar return from coal of the same species is obtained at Glasgow, and other towns in Scotland.

Cause of the Colouring Matter of Fruits.—Guyton Morveau supposes the red colour of fruits to be owing to the reaction of their own acid on the colouring matter, and that tin in restoring the colour of violets attracts from it the acid which had turned it red; lead, bismuth, zinc, antimony, and particularly iron, doing the same. The metallic oxides are not equally powerful, but the oxide of tungsten, he thinks, is superior to all others in forming cakes for painters.

Arsenic Acid.—This is a white substance, of a sour taste; it is anhydrous, deliquescent, and uncrystallizable. Its sp. grav. is 3·4. It requires for solution six parts of cold and two of boiling water. Its solution reddens vegetable blues, tastes acid and metallic, and is a virulent poison. When water is poured upon it, a part only is immediately dissolved, and another portion, as is the case with phosphoric acid, remains undissolved. After a time, upon agitating the solution, the whole is taken up. Heated to bright redness, it evolves oxygen, and is converted into arsenious acid. If dry arsenic acid be exposed to air, so as gradually to deliquesce, it sometimes forms crystals, which are extremely soluble, and have been considered to be probably hydrated acid. Arsenic acid gives a white precipitate with lime-water, and a peculiar reddish-brown with nitrate of silver. It yields a yellow deposit of a sulphuret of arsenic, when its solution is subjected to the action of a current of sulphuretted hydrogen gas. Arsenic acid consists, according to Berzelius, of—Arsenic 65·283, oxygen 34·717. Arseniates are produced by the union of this acid with the metallic oxides, and many which are insoluble may be formed by adding arseniate of potassia to their respective solutions. They are soluble in dilute nitric acid, and in such other acids as do not form insoluble compounds with their bases, and ammonia precipitates them from these solutions. They are readily decomposed by charcoal at a red heat, but many of

them, when heated alone, are unchanged, even at a higher temperature. They are decomposed when boiled in solutions of the fixed alkaline carbonates. The soluble arseniates generally give a white precipitate with lime-water; they are not immediately precipitated by solution of sulphuretted hydrogen. Protosulphate of iron gives a white precipitate, or yellowish, if arsenious acid be at the same time present. With acetate of lead, and acetate of zinc, they also give white precipitates.

POLARIZATION OF LIGHT.—According to Sir David Brewster, the following is the order in which the metals polarize most light in the plane of reflection:—Galena, lead, grey cobalt, arsenical cobalt, iron pyrites, antimony, steel, zinc, speculum metal, platinum, bismuth, mercury, copper, tin-plate, brass, grain tin, jeweller's gold, fine gold, common silver, and pure silver.

COMPOSITION OF MOSAIC GOLD.—There are several compositions of mosaic gold used by artists in varnished works. The following is the most generally known:—8 oz. of tin and of mercury being amalgamated together, are put into a matrass, with 6 oz. of sulphur, and 4 oz. of muriate of ammonia. The bottom of the matrass being ignited, the sulphuret sublimes; and if the heat be such as to make the mixture take fire, it is sublimed of a dazzling colour, in large hexagonal scales. The tin, minutely divided by its amalgamation, is oxidized by the muriatic acid of the muriate of ammonia; and the hydrogen, disengaged from the water of crystallization of this salt, combining with sulphur and caloric, forms a sulphuretted hydrogen gas. Muriatic oxide of tin and mercury, united with sulphur, in the form of cinnabar, also rises. The remaining oxide of tin and sulphur forms the mosaic gold.

OXIDE OF OSMIUM.—To obtain this oxide in a pure, solid, and crystallized state, grind together, and introduce when ground, into a cold crucible, three parts by weight of the insoluble powder, and one of nitre. The crucible is to be heated to a good red heat, on an open fire, until the ingredients are reduced to a pasty state, when osmic fumes will be found to arise from it. The soluble parts of the mixture are then to be dissolved in the smallest quantity of water necessary for the purpose, and the liquor thus obtained is to be mixed in a retort, with so much sulphuric acid, diluted with its weight of water, as is equivalent to the potassia contained in the nitre employed; but no inconvenience will result from using an excess of sulphuric acid. By distilling rapidly into a clean receiver, for so long a time as the osmic fumes continue to come over, the oxide will be collected in the form of a white crust on the sides of the receiver, and there melting, it will run down in drops beneath the watery solution, forming a fluid flattened globule at the bottom. When the receiver has become quite cold, the oxide will become solid and crystalline. One such operation has yielded 30 grains of the crystallized oxide, besides a strong aqueous solution of it. This may be agitated with mercury, and the product washed with hydrochloric acid, to remove the oxide of mercury which is formed. The osmium remains in the form of a metallic oxide, which acquires a metallic lustre by friction. When heated in the air, it burns into an oxide, and in its pulverulent state it is attacked by nitric acid; but after exposure to a red heat in close vessels, it becomes much less oxidisable. Osmium is extremely poisonous, and has an extraordinary influence on the brain and nervous system. Persons have been rendered delirious by inhaling osmic fumes.

COMPOSITION OF FALSE GEMS.—Wieland's composition for making paste is:—Powdered rock crystal, 4,056 grains; red lead, 6,300; pure potassium, 2,154; borax, 276; white arsenic, 12 grains; the whole to be fused until entirely clear. The colouring matter is obtained from the several metals. Gold: the purple of Cassius gives a fine ruby tint. Silver:

the oxide, or phosphate yellow. Iron: the oxides, blue, green, yellow, and brown. Copper: the oxide, a rich green when mixed with a small portion of tartar, which tends partially to reduce the oxide red. Antimony: a rich yellow. Manganese: black; in small quantities, purple. Cobalt gives blue of various shades, with the yellow of antimony or lead, green. Chrome produces fine greens and reds, depending upon its state of oxidisation. The basis of all artificial gems is paste. Another formula is as follows, with the composition of the several false jewels :—

Paste, or Strass.—Rock crystal, 6 oz.; red lead, 9 oz. 2 drachms; pearlash, 3 oz. 180 grains; boracic acid, 180 grains; arsenic, 5 grains. Mix, and fuse in a Hessian crucible; keep it liquid for 24 hours, then let it gradually cool.

Amethyst.—No. 1. Paste, 16 oz.; oxide of manganese, 15 to 24 grains; oxide of cobalt, 1 grain. Fuse together.

No. 2. Paste, 4,608 grains; oxide of manganese, 36 grains; oxide of cobalt, 24 grains; purple of Cassius, 1 grain. Fuse together.

Aventurine.—Paste, 300 parts; protoxide of copper, 40 parts; iron scales, 80 parts. Fuse the glass, and after the reduction of the copper let the mixture cool very slowly. The metallic copper will remain diffused through the glass in a crystalline form.

Beryl.—Paste, 3,496 grains; glass of antimony, 24 grains; oxide of cobalt, 1½ grain. Fuse.

Chrysolite.—Paste, 5 lbs.; calcined peroxide of iron, 3 drachms. Fuse together.

Red Cornelian.—Paste, 2 lbs.; glass of antimony, 1 lb.; calcined peroxide of iron, 2 oz.; oxide of manganese, 1 drachm. Fuse together.

White Cornelian.—Paste, 2 lbs.; calcined bones, 1 oz.; washed yellow ochre, 2 drachms. Fuse together.

Diamond.—Peroxide of tin, fused at a very high heat.

Emerald.—No. 1. Paste, 9,216 grains; acetate of copper, 72 grains; peroxide of iron, 1½ grain. Fuse.

No. 2. Paste, 5 oz.; oxide of copper, 39 grains; oxide of chrome, 2 grains. Fuse together.

Garnet.—No. 1. Paste, 427 grains; glass of antimony, 210 grains; oxide of antimony, 2 grains. Fuse together.

No. 2. Paste, 512 grains; glass of antimony, 256 grains; purple of Cassius, 2 grains; oxide of manganese, 2 grains. Fuse together.

Opal.—No. 1. Paste, 10 lbs.; calcined bones, ½ lb.

No. 2. Paste, 1 oz.; horn silver, 10 grains; calcined bones, 26 grains; magnetic oxide of iron, 2 grains. Fuse together.

Ruby.—No. 1. Paste, 5 oz.; oxide of manganese, 1 scruple.

No. 2. Paste, 16 oz.; purple of Cassius, 168 grains; peroxide of iron, 168 grains; golden sulphuret of antimony, 168 grains; manganese calcined with nitre, 168 grains; rock crystal, 2 oz. Fuse together.

Sapphire.—No. 1. Paste, 4,608 grains; oxide of cobalt, 68 grains. Fuse together for 30 hours.

No. 2. Paste, 8 oz.; oxide of cobalt, 49 grains; oxide of manganese, a few grains. Fuse together.

Topaz.—No. 1. Paste, 840 grains; glass of antimony, 36 grains; purple of Cassius, 1 grain. Fuse together.

No. 2. Paste, 3,456 grains; peroxide of iron, 36 grains. Fuse together.

ARTIFICIAL IRON PYRITES.—Crystallized iron pyrites was artificially formed by Wohler. In a glass flask, or other convenient vessel, there were subjected to a slow heat peroxide of iron, sulphur, and hydrochloride of ammonia; these were intimately mixed, until all the ammoniacal salt was sublimed; the mass was then suffered to cool slowly, and afterwards washed with water. At the bottom of the vessel there were discovered

heavy octohedra and tetrahedra, of a yellow colour, which were identical with the common crystallized pyrites. The larger the mass of materials, the larger and more perfect are the crystals obtained.

Affinities of Platina.—Platina unites easily with bismuth. With antimony its fusion is facilitated; but its weight and ductility are lessened. By zinc it is rendered more fusible, the alloy being very hard. It unites easily with tin, the alloy being very fusible; and, unless the tin is in large proportion, very brittle. It unites very well with lead. One ounce of platina being cupelled with 20 ounces of lead, the platina gains the power of being forged and soldered completely. It will not unite with forged iron; but, melted with crude iron, the alloy is so hard that the file will not touch it. It is ductile in the cold, but breaks short when hot. With copper, the alloy is ductile. When the copper is in the proportion of three or four to one, it takes a fine polish, and does not tarnish for years. With silver, the alloy is hard, without ductility, and tarnishes; but with gold it can only be alloyed by the most violent heat, the colour of the gold being greatly altered, and the alloy possessing considerable ductility.

Composition of Aqua Regia.—Aqua regia is formed by the mixture of the nitric and muriatic acids, in the proportion of two parts of the former and one of the latter. Four ounces of sal ammonia, dissolved gradually in the cold, in 1 lb. of nitric acid, forms an aqua regia. The muriatic acid in these processes attaches to itself a portion of the oxygen from the nitric acid, and, thus oxygenized, escapes in a yellow fume, whilst the nitrous gas which belonged to the nitric acid thus deprived of its oxygen, is absorbed by the unaltered portion of nitric acid, which it discolours, and changes to nitrous, thus forming a mixture of muriatic and nitrous acid. The nitro-muriatic is of a yellow colour, and its specific gravity is less than that of either of the acids employed. It readily dissolves gold, which is not done by either of the other acids of which it is composed. It is employed by dyers for the solution of tin, which, Gren states, nitric acid corrodes and oxidises, without dissolving.

Separation of Nickel from Cobalt.—Wohler's method of separating nickel from cobalt is as follows:—The arsenic is expelled by roasting the powdered speise first by itself, then with the addition of charcoal powder, till the garlic smell can be no longer perceived. The residuum is to be mixed with three parts of sulphur and one of potash, melted in a crucible with a gentle heat, and the product being edulcorated with water, leaves a powder of metallic lustre, which is a sulphuret of nickel, free from arsenic, while the arsenic, associated with the sulphur, and combined with the resulting sulphuret of potassium, remains dissolved. Should any arsenic still be found in the sulphuret, as may happen if the first roasting heat was too great, the above process must be repeated. The sulphuret must be finally washed, dissolved in concentrated sulphuric acid, with the addition of a little nitric; the metal must be precipitated by the carbonated kali, and the carbonate reduced with charcoal. In operating upon copper, nickel, or speise, in which nickel predominates after the arsenic, iron, and copper have been separated, ammonia is to be digested upon the mixed oxides of cobalt and nickel, which will dissolve them into a blue liquor. This being diluted with distilled water, deprived of its air by boiling, is to be decomposed by caustic potash, till the blue colour disappears, when the whole is to be put in a bottle, tightly stopped, and set aside to settle. The green precipitate of nickel, which slowly forms, being freed by decantation from the supernatant red solution of oxide of cobalt, is to be edulcorated, and reduced to the metallic state in a crucible, containing crown glass. Pure nickel, in the form of a metallic powder, is readily obtained by exposing its oxalate to moderate ignition.

Preparation of pure Gold.—A preparation of this metal for the

gold wire and leaf manufacturers, and other uses, may be made by dissolving ordinary fine gold in thin plates or grains, in moderately strong nitric acid, into which muriate of soda is to be scattered at intervals, whilst a gentle heat is to be applied; sulphate of iron is then to be dissolved in cold water and filtered, as well as the solution of gold; then mix twelve parts of the former with one of the latter, and allow the mixture to rest for twenty-four hours or more. The brownish precipitate is then to be boiled in a little pure nitric acid, and the gold washed with distilled water; finally, it is to be melted with a little pure nitre, and thus a perfectly pure fine gold may be easily and cheaply obtained.

MANUFACTURES.

Early Manufacture of Glass.—The origin of the manufacture of glass is involved in much obscurity. The art was well known to the Egyptians. A passage in Pliny attributes the discovery of glass to accident. A merchant vessel, laden with nitre, or fossil alkali, was driven ashore on the coast of Palestine, near the mouth of the river Belus, a small stream running from the foot of Mount Carmel, in Galilee, into the Mediterranean. The mariners, unable to procure stones to rest their cooking vessels upon, used pieces of their cargo instead. The fire reduced the alkali to a soft state, and incorporating with the river sand, it melted down into a vitreous stream. This circumstance was communicated to the inhabitants of the district, who availed themselves of the hint, and engaged in the manufacture of glass. Strabo and Josephus both state that the sand for about half a mile round the mouth of the river Belus was peculiarly adapted to the manufacture of glass, and it was much used in the glass-houses of Tyre and Sidon. The first account we have of the manufacture of glass in England, dates from the year 1439, at which period the countess of Warwick contracted with John Prudde, of Westminster, to erect a magnificent tomb for the earl, her husband. John Prudde is thereby bound to use "no glass of England, but glass from beyond seas," which stipulation, besides showing that the art of making window-glass was known and practised in England, likewise indicates that it was inferior to what was obtained from abroad. The finer sort of window-glass was made at Crutched-friars, London, in 1557. Flint-glass was first manufactured in England at the Savoy House, in the Strand, and the plate-glass, for looking-glasses, coach-windows, and similar purposes, was made at Lambeth, by Venetian workmen, brought over in 1670 by the duke of Buckingham. The art of glass-making was introduced into Scotland in the reign of James VI. An exclusive right to manufacture it within the kingdom for the space of thirty-one years, was granted to Lord George Hay, in the year 1610. This right was transferred, in 1627, for a considerable sum, to Thomas Robinson, merchant-tailor, in London, who again disposed of it, for £250, to Sir Robert Mansell, vice-admiral of England. The first manufactory of glass in Scotland was established at Wemyss, in Fife.

White Copper.—White Copper was formerly much used in Germany, for the manufacture of stirrups, bits, and spurs, as well as several other articles. The principal establishment for its manufacture was at Suhl, in the small duchy of Saxe Hildburghausen. Its composition was:—Copper, 88·00; nickel, 8·753; sulphur, with a little antimony, 0·750; silex, clay, and iron, 1·750.

Steel Manufactures in France.—The great seat for the manu-

facture of cutlery in France, is Chatellerhault, in the province of Poitou. All descriptions made there are, however, immensely inferior to our Sheffield wares.

BIDDERY-WARE.—This metal is so called from a city of that name in Hindoostan, about sixty miles north-west of Hyderabad. It resembles pewter or zinc, but the natives of the East prefer to give it a sable hue, in order to throw up the silver with which it is generally inlaid. Dr. Heyne says it is composed of—Copper, 16 oz.; lead, 4 oz.; tin, 2 oz. To every 3 oz. of the alloy, 16 oz. of spelter is added when the metal is melted for use. To give the ware its esteemed black colour, it is dipped in a solution of sal ammoniac, saltpetre, common salt, and blue vitriol.

IRON-WORKS OF GREAT BRITAIN.—Iron has been wrought in England since the time of the Romans, by whom works were established in the Forest of Dean in Gloucestershire. In Kent and Sussex, counties well supplied not only with iron ore, but also with timber, the only species of fuel then used in the furnaces, works were also established at a very early period. The production of iron was long retarded, from the nature of the fuel employed in smelting. Complaints were early made of the destruction of timber by the iron-works. In the reign of Queen Elizabeth, 1584, an act was passed, prohibiting the manufacturers of iron from using any but small wood, and establishing new works in any place within twenty-two miles of the city of London, and fourteen of the river Thames, as also in several parts of Sussex. Soon afterwards, Edward, Lord Dudley, invented a process for smelting iron ore with pit coal, instead of timber, and obtained a patent for his invention, which was exempted from the operation of the act, 21 James I. c. 23, setting aside monopolies; but the works of the inventor were destroyed by an ignorant rabble, and he was nearly ruined by his efforts to introduce and perfect a process which has eventually proved of immense benefit to the country. For many years the invention seems to have been forgotten, and it was not till about 1740, that the growing scarcity of timber, coupled with increasing demand for iron, caused the revival of the process. The ores principally employed were brown and red hematites. Earthy iron ores were also smelted, but it does not appear that the clay ironstones of the coal basin were then used. At that period there were fifty-nine charcoal blast-furnaces, whose annual produce was 17,350 tons of cast-iron. By the year 1788, several attempts had been made to reduce iron ore with coked coal, and there remained only twenty-four charcoal blast-furnaces, while there were fifty-three coke-furnaces in activity. The production of iron for that year was, by means of coals 48,000 tons, and by charcoal 13,100 tons —making a total of 61,900 tons. The iron-works of South Wales and Monmouthshire are comprised in a range of country extending in the direction of north-west and south-east about twenty-five miles from one extremity to the other. The works at Hirwain, in Brecknockshire, and Aberdare, in Glamorganshire, form the extreme points to the westward. But the great seat of the manufacture is Merthyr Tidvyl, from which there is a continued line of furnaces at Dowlais, Romney, Tredegar, Howey, Beaufort, Nantyglo, Blaenfon, Varteg, Abersychan, and Pontypool. About the middle of the last century, Merthyr Tidvyl was an insignificant village. In 1755, the lands and mines, for several miles round the village, were let for ninety-nine years, at a rent of £200 per annum. The Staffordshire iron-works, including those of Warwickshire, are principally situated in the district which extends from Wolverhampton, round by Walsall to Birmingham, and thence round by Dudley. The principal seat of the works in Shropshire is Colebrooke-dale, where the improvement of the manufacture commenced. In Scotland, almost all the iron-works, with the exception of the Carron, contiguous to the Frith of Forth, and at Muirkirk, Ayrshire, are situated on the Clyde, at no great distance from Glasgow.

MANUFACTURE OF BRASS IN PRUSSIA.—At the brass manufactory at Hegermuhl, near Potsdam, the materials of one charge are commonly 41 lbs. of old brass, 55 lbs. refined copper (gahrkupfer) granulated, and 24 lbs. of zinc. This mixture, weighing 120 lbs., is distributed into four crucibles, and fused in a wind-furnace, with pit-coal fuel. The waste varies from 2½ lbs. to 4 lbs. upon the whole.

CORINTHIAN BRASS.—This metal, so famous in antiquity, is a mixture of gold, silver, and copper, and is supposed to have been produced by the fusion of these metals, in which that city abounded, when it was sacked and burned by Lucius Mummius, in the 156th Olympiad, about 146 years before the Christian era. Of this valuable metal but little is known. Its epoch of being in use must have been very short, as we are told by Pliny the art of making it had been for a long time utterly lost, and no remains of it are now in existence.

EARLY METALLIC MANUFACTURE IN ENGLAND.—Until the last century the metallic industry of England was at a low ebb. In May, 1518, there was a rising of the workmen of London against the foreigners who sold metal goods. Macpherson, adverting to it, says, "The pretended crimes of these foreigners were, probably, their working cheaper, and being more industrious than our own people, whose exclusive privileges kept the foreigners in the out parts, and out of the freedom." This rising was considered of such momentous importance, that the statute of Henry VII. was revived for their protection. In this it is enacted that "no merchaunt straungers should brynge into the reolme of Ynglond to be soulde mans gyrdylles, harynis wrought for gyrdylles, poynts, laces of lede, purses, pouches, pynnes, knyvys, hangers, taylour sherys, sesors, and yrens, cobords, tonges, fyer forkes, grydyrens, stocks, cocks, keys, hinges, ayny betyn gold or betyn silver, horse harneys, bittes, storroppes, currets, ston dynge condlesticks, hongyng condlesticks, holy water scoppers, chafyinge dishes, hongynge covers, curtenrynges, closhes for gloves, bokelles for shoys, spones of tynn and lede, cheynes of wire, as well latten as of silver." The first mill for rolling and slitting of iron, in England, was constructed by Godfrey Box, of Liege, at Dartford, in 1590. A paper-mill now stands on the site.

MANUFACTURE OF GOLD.—Under the head "Gold made by Art with loss to the Workman," Gabriel Plattes, in his *Discovery of Subterranean Treasure*, gives an account of his transmutation of iron and copper to gold. His formula is this:—"I took 8 ounces of regulus of iron and copper, made as beneath is declared, and 16 ounces of common sublimate, bought at the apothecaries, and made these ingredients into a fine powder: first severally, and then I ground them well together, upon a marble stone, and so put them into a retort of a glass, and drew from them, first an oil, then a substance like butter, and lastly a yellow sublimate, tinted with the tincture of iron and copper, which yellow sublimate I rectified three or four times, till it was very pure; then I mixed it with equal parts of an amalgam of silver and quicksilver, made as beneath is taught, and put it into another retort of glass, and forced away all but the silver, which remained like yellow horn; this yellow silver I amalgamated again with new quicksilver, and set it in a gentle heat above a week; then in a very strong heat for six hours, so that the quicksilver rose up and fell down again upon the silver, till such time as it had carried up all the silver from the glass into branches, like trees; then I melted down the silver, and fined it, and parted it with aqua fortis, and had divers grains of pure and good gold abiding all trials; but the quantity would not pay for half the charge and labour. I made the regulus thus: I took 4 ounces of iron in stub nails, and made them red hot in a crucible, and then I put to it 8 ounces of crude antimony, and melted it down; and when it was well and thin melted, I let it cool in the pot, and so knocked off the

regulus from the top or cinder which lay upon the top of it; then I did the like with 4 ounces of copper in thin plates, and then I mixed equal parts of these two, and melted them three or four times, every time casting into the pot half an ounce of saltpetre, as it was melting, to purify it, till it was pure and bright, almost like silver, but yet brittle, so that I could beat it in a mortar to fine powder. The yellow silver that was like yellow horn did amalgamate with much difficulty and grinding with salt and vinegar, and some of it was lost, do what I could; but the first silver was water silver, which I bought at the refiners, out of which they had taken all the gold before; this did amalgamate very easily; then I strained it to a ball through a leather skin, and so mixed it with the yellow sublimate that was tincted yellow with the tincture of iron and copper. The proportion of the quicksilver to the silver was five or six parts to one. If any one doubt the truth of alchemy, he may be satisfied by this trial; but instead of gain, he shall pay for his learning by going away with loss. But if any one will uphold me as good a lease, or purchase of land, as I can prove by credible records hath been had in former times, for an ounce of gold, I will undertake to make an ounce of gold, not having more pay for it, yet have a good bargain."

Manufacture of Iron by the Biscayan Forge.—The Biscayan forge can only be used in countries where wood is cheap and abundant; it is somewhat similar to the Catalan forge, of which it is a variety. The tuyère is placed about 9½ inches above the bottom. The hearth is lined with a layer of charcoal dust and loam, worked together, and the ore, after being roasted, is sifted—the small powder being set aside to be used in the course of the operation. The ore is piled up on the side opposite to the blast, in a sharp saddle ridge, and it occupies one-third of the furnace. In the remaining space of two-thirds, the charcoal is put, to solidify the small ore on the hearth—it is covered with moist cinders, mixed with clay. The fire is urged with moderation during the first two hours—the workmen being employed in pressing down more charcoal as the former supply burns away, so as to keep the space full, and prevent the ore from crumbling down. After two hours, the full force of air is given, at which period the fusion ought to commence. It is easy to see whether the torrefication be sufficiently advanced, by the state of the flame and appearance of the ore; the workman now completes the fusion by detaching the pieces of ore from the bottom, and placing them in front of the tuyère. When fine siftings are thrown on the top, they must be watered, to prevent their being blown away, and to keep them evenly spread over the whole surface of the light fuel—they increase the quantity of the products, and give a proper fusibility to the slag. When the slag is viscid, the quantity of siftings must be diminished—if thin, they must be increased. The excess of slag is allowed to run off by the *chio*, or floss-hole. The process lasts from five to six hours, after which the pasty mass is taken out and placed under the hammer, to be cut into lumps, which are afterwards forged into bars. Each mass presents a mixed variety of iron and steel, in proportions which may be modified at will; by using much of the siftings, and making the tuyère dip towards the sole of the hearth, iron will be the chief product; if the operation be conducted slowly with a small quantity of siftings, and an upraised tuyère, the product of steel is more considerable. The weight of the lump of metal will vary from 200 lbs. to 400 lbs.

Manufacture of Iron in Scandinavia.—There are several works established in Scandinavia, which deliver very good rough castings. The pig-iron is exported from Glasgow, and the fuel used is English coke. Although the peninsula abounds with iron, yet the roads are so bad, and consequently the transport so expensive, that it can be produced in the sea-port towns at a much lower rate than at the mines, notwithstanding the freight,

insurance, duty, and other charges the importer has to pay. The greatest quantity of the iron produced there is exported to North America, where it realizes from $80 to $100 per ton. The famous Swedish iron produced at Danemora, and which makes the best cutlery, is shipped to Hull—a large mercantile firm there having had the contract for several years of their produce. The iron trade is regulated in Sweden by the government: in order that the poorer mines should not be abandoned, the richer are obliged to diminish their produce—so that the market may not be overstocked, nor are they allowed to sell at a lower rate than fixed by the committee of the "Jern Värks Contoir."

TORREFICATION OF COBALT IN SAXONY.—The ores of cobalt are torrefied in Saxony in furnaces; the arsenical vapours, attaching themselves to the sides, yield the arsenic of commerce. When the oxide of cobalt is cleaned of arsenic, it is known by the name of "zaffre." The zaffre of commerce is mixed with three-fourths of sand. This oxide, fused with three parts of sand and one of potash, forms a blue glass, which, when pounded, sifted, &c., forms smalt. The most simple way of obtaining cobalt in its metallic state is to reduce it from smalt, by fusing one part of smalt with six of soda.

MINES.

MINING LAWS OF ATHENS.—The most considerable mines belonging to the Athenians were the silver-mines of Laurion, from the proceeds of which Themistocles first raised the naval power of Athens to a state of efficiency. These mines extended from coast to coast, in a line of about seven English miles from Anaphlystus to Thoricus. The working of them appears to have been very productive in the time of Themistocles, less profitable in that of Socrates and Xenophon, and before that of Strabo they were exhausted. The ores contained silver and lead with zinc, and probably copper. At Thoricus, spurious emeralds occurred in combination with the ore; cinnabar was also found there. The mines were worked by shafts and adits. The process of fusion carried on in the furnaces appears to have been the same as that employed in other mines. The State was the sole proprietor of the mines, but they were never worked at the public expense, nor did the State ever let them for a term of years, like other landed property. They were always granted to private individuals in fee-farm, and these leases were transferred from one to another by inheritance, sale, and other kinds of legal conveyance. The sale of the mines, or rather the right to work them, was managed by the poletæ, and this right was purchased at an appointed price, in addition to which, the possessor paid the 24th part of the net produce as a perpetual tax. The purchase-money was paid directly to the State, but the contingent rents were probably let to a farmer-general. There was a mining law, and a particular course of legal proceeding in cases relating to mines, which, for the greater encouragement of the proprietors of mines, were, in the time of Demosthenes, annexed to the monthly suits. The mines were also free from property taxes, and did not subject the possessor to the performance of liturgies.

GOLD IN FRANCE.—This metal has been found in France, although in exceeding small quantities. In the year 1781, a vein was discovered at Gardette, in the valley of Oysans, department of the Isère. This vein consisted of quartz, which traverses a gneiss mountain, and contained auriferous sulphuret of iron, besides some specimens of native gold, but the

quantity obtained was found insufficient to repay the expense of operations. Many of the rivers, as the Rhone, the Rhine, the Garonne, and others of smaller note, furnish auriferous sand. Veins of auriferous sulphuret of iron, traversing gneiss rocks, have been discovered at the foot of Mount Rosa, in Piedmont; and the sands of some of the rivers, and various parts of the soil, on the south side of the Apennine mountains, are likewise auriferous.

Silver-Mines in France.—These are not of any great importance. The mine of Allemont, in the department of the Isère, is situated near the summit of a lofty mountain, composed of beds of gneiss and primitive limestone, inclined in different angles to the west. The veins are numerous, and run in all directions. The ores are native silver, sulphuret of silver, red silver, and a small quantity of muriate of silver. They are accompanied by different ores of cobalt, antimony, and nickel; the matrix is usually clay mixed with iron, calcarious spar mixed with asbestos, and other earthy minerals. Indications of silver have also been observed in the Vosges, where, in a vein of grey copper ore, has been found a certain proportion of this precious metal.

Copper-Mine of France.—The only copper-mine in France is at Chessy, near Lyons. It is but partially worked, the production was never of any great extent; its greatest celebrity was derived from the beautiful specimens of blue and green carbonates which were obtained from it. The furnaces used there are the half-high German furnaces; they are of a very high antiquated construction, and are now nearly everywhere exploded.

Lead-Mines in France.—The most considerable are those of Poullaouen and Huelgoet, in the department of Finisterre, which have been worked into two parallel veins, included in primitive rocks. There are also deposits of lead in the Vosges, where the galena is disseminated in a thick vein of decomposed granite, in the department of Sambre and Meuse, where the veins traverse limestone nearly in a vertical position, and in other places, where, in their distributions and productions, the mines are analogous to those of Great Britain. The produce of the French mines is about 30,000 quintals of lead annually.

Antiquity of the Mines of Almaden.—The most ancient mine of quicksilver known in the world is that of Almaden, in Spain. According to Pliny, it was wrought 500 years before the commencement of the common era; and in his time 10,000 lbs. of cinnabar were transported to Rome for the purpose of being employed in painting. This celebrated mine, or rather cluster of mines, is situated in a branch of the Sierra Morena, upon the confines of Andalusia, about 15 leagues to the north of Seville. The hill which contains it is about 1,000 fathoms in length, 600 in breadth, and 120 in height. It is composed of the same materials as the neighbouring mountains, which consist of sandstone, and its surface exhibits two inclined planes, which, uniting at the summit, form a crest of rock that is entirely bare, and spotted with sulphuret of mercury.

Gold-Mines in Spain.—There are several auriferous lodes in Spain. A mine called Domingo Florès, situate at Medal, in the kingdom of Leon, was worked by royal concession, from May 11, 1639, to June 26, 1644, and afterwards from 1733 to 1749, at which period it was abandoned, in consequence of the interdiction issued by the Government to stop the working of mines in Spain, in order to direct the attention of the metallurgists to those of America.

Mines of Galicia.—The province of Galicia is said formerly to have been celebrated for rich mines of gold and silver: its metallic productions at present are confined to lead, copper, and tin. Between Corunna and Betanzos there are quarries of jasper and white marble, and in the other places there are found marcassite, vitriol, and sulphur. There are many

hot springs in the country. One part of the town of Orense, in consequence of the number of these thermal waters, which warm the air by their vapours, enjoys all the mildness of spring while the opposite part is experiencing all the rigours of winter. The deposits of tin in Galicia have not as yet been worked. There are lead, silver, copper, and coal mines in several of the Spanish districts. Coal exists in Portugal in the provinces north of the Douro; but the inertness of the resident hidalgos, and the unsettled habits of the population, have rendered them careless of its value.

MINING SCHOOLS IN GERMANY.—The most celebrated are those of Freiberg, in Saxony, and Clausthal, in the Hartz district, in Hanover. Lectures are delivered in both these colleges, on practical chemistry, assaying, mining, mechanics, mathematics, geology, and mineralogy, by able professors, who are appointed by Government. Permission is given to the students to manipulate in the laboratory, and free access is granted to all the mines. Diplomas are given on passing examination, but it is not customary to appoint foreigners to any situation in the mines or smelting works. Living is very cheap in both districts, and the fees required would be trifling in comparison with those necessary in England; but a correct knowledge of the German language is indispensably requisite in order to render all the advantages afforded by these institutions available.

COAL IN NEW SOUTH WALES.—The total extent of the coal tract in the vicinity of Newcastle, Port Hunter, has not been ascertained; but the sales by the Australian Agricultural Company, in 1840, amounted to 20,000 tons. In 1845, the company had usually 10,000 tons ready on hand, the price being 11s. per ton, delivered at the works, and at Sidney 22s. per ton. The sales in 1847 amounted to 40,000 tons. The monopoly by the company having been surrendered in 1847, several works have since been opened by private speculators, and a seam of ten feet in thickness has recently been discovered within two miles of the place of shipment, so that the company are now enabled to meet a demand of 300 to 400 tons per day, if required. There is no reason, therefore, to apprehend any deficiency of supply for the use of steamers upon this coast; and it is even supposed that the copper of South Australia might be smelted near Port Hunter with advantage, as vessels of 300 or 400 tons can lie in the port of Newcastle in perfect safety, under the end of the coal-slips.

ANTIQUITY OF THE DIVINING ROD.—The use of the divining rod is of considerable antiquity, both in Spain and Germany. It was first introduced into England in the reign of Queen Anne, by a renegade Spaniard, of the name of Riberia.

GOVERNMENT INSPECTION OF MINES IN SAXONY.—All the mines and manufactories of metals in this country, whether public or private, are subject to Government superintendence. The principal inspector, who ranks with a general officer, is styled the Ober Berg Hauptmand. Under him are various officials, of different grades, in the several departments of mining, smelting, and manufacturing; these report quarterly to him the various occurrences which have passed in their districts. A condensation of this is embodied in the form of an annual report, and transmitted to the Minister of Finance, who is considered the supreme chief of this branch of national industry.

IRON-MINES OF ELBA.—The island of Elba possesses one of the richest iron-mines in the world. Its existence appears to have been known from the earliest times. The ore is chiefly of the specular kind, and the mass constitutes an entire mountain, which is surrounded by others consisting of granite, of which the island is almost wholly composed. The mountain, which is called Rio, is about 500 feet in height, and three miles in circumference, and its surface is covered with a reddish ochry earth, which in some places is several feet in thickness, and full of small shining scales of

iron ore. Beneath this covering, the mass of the mountain consists of metallic ore, or rather accumulated masses, thrown together without any order of stratification. These masses are deposited in an ochry substance, which may be considered as their matrix; and besides the specular ore, which preponderates, other varieties are occasionally met with. The iron-mines of Elba were wrought in the time of the Romans, by means of excavations carried into the mountain; but now the ore is extracted by the ordinary process of quarrying. It has been conjectured by some, that the mass of iron ore in the island of Elba is part of a great vein, of immense extent, running into the adjacent continent.

Silver in Scotland.—Great quantities of silver have been, at different times, found in England. Mines of this metal were said to exist in Sutherland. In Sir Robert Gowlen's "History of the Earls of Sutherland," he thus mentions them:—"In Southerland there are silver mynes which have been hithertoo neglected. Their was ane essay of these mynes carried to London the yeir of God 1620 by the deceast Sir Thomas Menzies, and being tryed in England, they were verie rich. But he concealing in what part of Southerland the same was found, and dying upon the way at that tyme in return from London towards Skotland, the state is hithertoo depryved of the benefit of these mynes, until it shall please God in his appoynted tyme to discover the same."

Salt-Works of Poland and Hungary.—Those of Poland are at Vilitzca, near Cracow; the Hungarian are at Saltzburg, in Upper Hungary. The rock-salt produced there is of different colours; the blue and red variety always loses its colour when exposed to the air, while the yellow retains it. At Neusol, there is a statue of rock-salt which acts as a barometer; it grows moist when there is an appearance of rain, but it is always dry when the weather is settled, or likely to become fair.

ELECTRICITY.

Early Discovery of Electricity.—The first discoverer of electricity is said to have been Thales, of Miletus, who flourished about 600 years before the Christian era. He is reported by subsequent writers to have described the power developed in amber by friction, by which it was enabled to attract bits of straw, and other light bodies, and an attempted explanation of this phenomenon is given in one of his philosophical dogmas.

Construction of the Voltaic Battery.—Raise a pile, by placing a plate of zinc, a piece of card or woollen cloth, and a plate of silver, on each other; then a second piece of zinc, &c., successively, until the elevation is at some height, for the effects are greater in proportion to its height; immerse the pile in acidulated liquid; then touch both ends of the pile, at the same instant, with one piece of iron wire, which runs through holes in the centre of each plate. On contact, a spark is excited from the extremities of the pile, and luminous points are often perceived at different heights, where the zinc and silver come into mutual contact. The zinc end of this pile appears to be negatively electrified; that formed by the silver, on the contrary, indicates marks of positive electricity. If both extremities of the pile are touched, after the hands are dipped in water, or a saline solution, a disagreeable pricking in the fingers and elbow is felt. If there is placed in a tube, filled with water, and hermetically closed by two corks, two wires which are in contact at the other extremity—one with the summit, the other with the base of the pile—these ends, even when separated

only by the space of a few lines, experience evident changes at the instant the extremities of the pile are touched. The wire in contact with the part of the pile composed of silver becomes covered with bubbles of hydrogen gas; that which touches the extremity formed by zinc becomes oxydized, or gives off oxygen gas. Fourcroy attributes this phenomenon to the decomposition of water by the galvanic fluid, which abandons the oxygen to the metal that touches the positive extremity of the pile, then conducts the other gas invisibly to the end of the other wire, there to be disengaged.

USES OF ZINC IN ELECTRICITY.—Zinc and iron produce a more copious current than even zinc and silver, or zinc and platinum, both in dilute sulphuric and dilute nitric acid. The plates of the zinc and the platinum pair must have a surface three times as great as that of the zinc and iron to yield the same quantity of electricity; but the intensity of the current excited by zinc and iron is smaller. If the quantity of electricity yielded by zinc and iron be 260, that by zinc and copper is 100. When the plates are connected by a wire 50 feet long, the yield by zinc and iron is 33·7, and by zinc and copper 18. The resistance of the long wires diminishes, therefore, the quantity yielded by the zinc and iron from 100 to 13, and by zinc and copper from 100 to 18. When the plates are connected by a fine wire 2,000 feet long, the quantity of electricity yielded by zinc and iron is to that furnished by the zinc and copper as 1,000 is to 1,678. With amalgamated iron zinc yields a much feebler current than with common iron. Gottling constructed a powerful pile with plates of iron covered with zinc on one side, and moistened pieces of cloth. Zinc, either common or amalgamated, is almost always used as the positive metal of the battery, but since common zinc is subject to ordinary chemical action, and likewise, on account of alloys mixed with it, to local galvanic action, and since these actions continue even when the circuit is open, a great deal of zinc and acid is uselessly consumed. By the use of amalgamated zinc, first introduced by Sturgeon, this loss is avoided. With this kind of zinc, however, the current is soon reduced to 1-8th or 1-10th of its original strength, because no gas is evolved on the zinc, and, consequently, the acid does not get well mixed; but, on breaking contact for a while, the current regains its former power. Rolled zinc plates are preferable to those of cast zinc, which are less pure. New plates act better than such as have been used two or three times, perhaps because the alloys come out more prominently as the surface dissolves, and thus give rise to local galvanic action. This deterioration of zinc plates by use soon reaches its limit in the case of rolled zinc, but with cast plates it goes on continually. The more smoothly the plates are rubbed, the better they work. For the negative metal, copper, iron, lead, silver, platinized silver, platinum, graphite, or peroxide of lead, may be used.

GROVES' GAS BATTERY.—This consists of a series of tubes, containing slips of platina foil, covered with a pulverulent deposit of the same metal. The tubes are arranged in pairs, in separate vessels of dilute sulphuric acid; and of each pair one tube is charged with oxygen, and the other with hydrogen gas, in quantities such as to allow the platina to project above the dilute acid into the atmosphere of gas in the upper part of the tube. The platina in the oxygen of one pair is metallically connected with the platina in the hydrogen of the next; thus a series may be composed of any number of pairs. A battery of four cells, constructed in this manner, will decompose acidulated water; a single cell will decompose iodide of potassium, and 20 pairs will produce very powerful effects—such as giving a shock which may be felt by several persons at once—producing a brilliant light between charcoal points, &c. When the poles are unconnected, a gold leaf electroscope, connected with either of them, is sensibly deflected. When distilled water is substituted for acidulated water in the cells of the battery, the effects are similar, but more feeble.

SPENCER'S APPARATUS FOR ELECTROTYPING.—A cylinder of glass, wood, or glazed earthenware (having a rim at the bottom for retaining the gypsum), is closed at the lower end with a diaphragm, three-fourths of an inch thick. It contains zinc, immersed in a solution of common salt, and is itself surrounded by a solution of sulphate of copper, which contains the body to be coppered. The operation succeeds best when the surface to be coppered is of the same size as the zinc surface, and that of the gypsum greater than either. The zinc is frequently cleansed, and the salt solution occasionally renewed. When the process is continued for some time, the copper solution must likewise be renewed, otherwise the sulphuric acid which is set free prevents the precipitated copper from assuming a solid consistence, and converts it into a brown-red powder; in such a case the copper must be cleaned with very dilute nitric acid. The formation of a layer of copper, one-eighth of an inch thick, takes eight or ten days.

ELECTRICAL BELLS.—These are used in a variety of entertaining experiments by electricians. The apparatus, which is originally of German invention, consists of three small bells suspended from a narrow plate of metal, the two outermost by chains, and that in the middle, from which a chain passes to the floor, by a silken string. Two small knobs of brass are also suspended by silken strings, one on each side of the bell in the middle, which serve for clappers. When this apparatus is connected with an electrified conductor, the outermost bells, suspended by the chains, will be charged, attract the clappers, and be struck by them. The clappers becoming electrified, will likewise be repelled by these bells, and attracted by the middle bell, and discharge themselves upon it by means of the chain extending to the floor; after this they will again be attracted by the outermost bells, and thus, by striking the bells alternately, occasion a ringing which may be continued at pleasure. Flashes of light will be seen in the dark between the bells and clappers, and if the electrification be strong, the discharge will be made without actual contact, and the ringing will cease. An apparatus of this kind, connected with one of those conductors which are erected for protecting buildings from lightning, will serve to give notice of the approach and passage of an electrical cloud.

GILDING AND PLATINIZING.—Bottger makes use of the following apparatus for gilding and platinizing. A wide cylinder has a hole in the middle of its base, through which there passes a copper wire, cemented in with sealing-wax. The part of the wire within the cylinder is formed into a flat spiral, upon which is laid a piece of amalgamated zinc. The cylinder contains very dilute sulphuric acid; in this is immersed a cylinder, open at the top and bottom, but tied over at the bottom with a thin bladder. The cylinder contains solution of gold, in which the metal to be gilt is immersed, after it has been first connected, by means of a platinum wire wound round it, with the copper wire proceeding from the zinc. The gold solution contains one part of chloride of gold, freed as much as possible from excess of acid, in 160 parts of water, or, still better, chloride of gold and sodium dissolved in water. Each immersion lasts for a minute at the utmost, and is followed by washing with water, and drying (accompanied by brisk rubbing with fine linen) and polishing with powdered chalk. Silver requires five or six, steel ten or twelve, immersions, lasting from half a minute to a minute. When the silver object is connected with the zinc by a copper wire, part of which dips into the solution of gold, the gilding acquires a strong reddish tint; whereas, when silver or platinum wires are used, it is of a full bright yellow. If the gold solution contains the smallest trace of copper, scarcely anything but copper is at first deposited upon the silver. Copper also does not show any appearance of gilding, for some time, because the red colour of the metal shines through. Brass may be gilt almost as well as silver; tin not so well. German silver gives a coppery

kind of gilding, not very beautiful. Watch springs take a very beautiful gilding when they are freed by hydrochloric acid from the blue film of oxide. On long knives the gilding is not uniform, being thickest at the end next the zinc. Steel, which is to be gilt, must be highly polished without oil; that which has been polished with oil does not take the gold, for it retains particles of oil closely attached to its surface, so that it is scarcely attached by strong hydrochloric acid.

ELECTRIC LIGHT.—This magnificent light may be shown by a small battery; a piece of charcoal or coke is attached to the ends of the wires in connection with the positive and negative poles, and when brought into contact, and thus completing the galvanic circuit, the carbon points immediately become incandescent, giving out a brilliant and dazzling light. Although not in actual combustion, the charcoal or coke is constantly undergoing gradual abrasion at one pole, while an accumulation is taking place at the other; and as the distance between the two lengthens, the light becomes less and less brilliant, and at length disappears. It is the difficulty of obtaining the carbon of a perfectly clear, solid, and homogeneous nature, and of devising some simple and self-acting plan by which, as the distance is increased, they should be pressed forward to their proper position, and thus keep up the brilliancy and regularity of the light, which has hitherto baffled the patentees in their endeavours to render this beautiful light available for public illumination or domestic purposes. Perhaps the greatest of all the difficulties lies in the fact, that *one light* only can be obtained from one galvanic circuit.

ELECTRICAL AND CHEMICAL APPARATUS CEMENT.—Mr. Singer's consists of 5 lbs. resin, 1 of bees'-wax, 1 of red ochre, and two table spoonfuls of plaster of Paris, all melted together. A cheaper one, for cementing voltaic plates into wooden troughs, is made with 6 lbs. of resin, 1 lb. of red ochre, $\frac{1}{2}$ lb. of plaster of Paris, and $\frac{1}{4}$ lb. of linseed oil. The ochre and plaster of Paris should be previously calcined, and added to the other ingredients in their melted state. The thicker the stratum of cement that is interposed, the stronger, generally speaking, is the junction.

MISCELLANEA.

EARLY ASSURANCE COMPANIES.—The first system was that of Tontines, invented by Laurence Tonti, a Neapolitan, in 1653. The plan was this:— A certain number of persons clubbed together a specific sum annually, without reference to age or sex; at the expiration of each year the interest was divided amongst the subscribers who were living, and so on from year to year, until the last survivor received the whole of the interest. In 1689, the last survivor of a tontine in France was a widow, who, at the period of her death, at the age of ninety-six, enjoyed an income of 73,500 livres (£3,062. 10*s.*) for her original subscription of 300 livres (£12. 10*s.*) The first assurance company founded in England was the Amicable, in 1707; the next were, the London Union, 1714; the Royal Exchange, 1720; and the London Assurance, 1721. There are at present above 130 insurance offices in Great Britain and Ireland, which have an established name. In 1831, the value of insured property was something above £526,000,000. In 1841 it amounted to £682,000,000, being about an increase of thirty per cent. in ten years, and since then it has increased in equal proportion.

INCORPORATION OF THE EAST-INDIA COMPANY.—This association was first incorporated by Queen Elizabeth, A.D. 1600, under the title of

"The London Company of Merchants trading to the East Indies for the purpose of extending the commerce and navigation of their country in the seas and among the islands and continents east of the Cape of Good Hope." They enjoyed the monopoly precisely 100 years, at the expiration of which period a second company arose, which, like the first, obtained a charter, and between which and the old company a rivalry, at once mischievous to themselves, and, as it was then believed, hurtful to the mother country, arose. William III., who incorporated the latter body, interfered to put a stop to this state of things. The two firms were persuaded to come to an understanding with one another, and a new charter raised them into a corporate body, which still exists as "The United Company of Merchants of England trading to the East Indies."

Introduction of Steam Navigation in Great Britain.—Steam-boats commenced plying on the Clyde in 1812. The first was seen on the Thames in 1815. A steamer arrived in Liverpool from New York in 1819; and in 1825 the first steam voyage was made to India.

Invention of the Chronometer.—The first inventor of the chronometer was John Harrison, the son of a poor carpenter in Yorkshire. For this invention, in the year 1759, he received a premium of £20,000 from the Government. He had been studying how he could alter a clock, so as not to be subject to any irregularities from the motion of the ship or the difference of climate, from the end of the reign of Queen Anne until he brought it to perfection, having occupied forty-five years in its unremitting study.

Localities of Fuller's-earth.—Great quantities of fuller's-earth round about Nutfield, Reigate, and Bletchingley, to the south of the Downs, but of inferior quality, near Sutton and Croydon, to the north of them. The most considerable pits are near Nutfield, between which place and Reigate it lies so near the surface as to be turned up by the wheels of the waggons. It is not known how long this earth has been wrought in Surrey; the oldest pit now wrought is said to have lasted between seventy and eighty years, but is fast wearing out. The seam of fuller's-earth dips in different directions. There are two kinds of it, the blue and the yellow; the former on the eastern side of the pit, between Redhill and Nutfield, is frequently within a yard of the surface, being covered merely with the soil, a tough, wet, clayey loam. A few yards to the west, the blue kind appears, with an irony sandstone, of nearly two yards in thickness, between it and the soil. The blue earth in this pit is nearly sixteen feet deep. In some places the yellow kind is found lying on the blue. There does not appear to be any regularity, either in the position or inclination of the strata where the fuller's-earth is found, nor any mark by which its presence could be detected; it seems rather thrown in patches, than in any continued or regular vein. In the midst of the fuller's-earth are found large pieces of stone of a yellow colour, translucent, and remarkably heavy, which have been found to be sulphate of barytes, encrusted with quartzose crystals. These are carefully removed from the fuller's-earth, as the workmen say they often spoil many tons of it which lies about them. There is also found with the yellow fuller's-earth a dark brown crust, which the workmen consider also as injurious. In Surrey the price of fuller's-earth seems to have varied but little: in 1730 the price at the pit was 6s. a sack, and 6s. load, or ton. In 1644 it was nearly the same. It is carried from the pits on tram-roads to Westham, along which it is taken to the banks of the Thames, where it is sold at the different wharfs. It is thence shipped off either to the north or west of England. A considerable quantity is also taken down into Wiltshire by the waggoners, especially when they have not a full load.

Antiquity of Coal-Mines.—Newcastle obtained the first charter

on record to dig for coals; this was in 1239, and in 1281 the export was considerable. A cubic foot of coal, of average quality, weighs from 75 lbs. to 80 lbs.; and an acre, two feet thick, will yield 3,000 tons, and five feet thick, 8,000 tons.

COMPOSITION OF WINDOW GLASS.—Common window glass is composed of soapboilers' waste six bushels, kelp three ditto, sand four ditto. When these materials have been calcined for from twenty to thirty hours, they are removed with iron shovels, while red hot, to the melting-furnace, where the pots are filled with it. By exposure to the heat twelve or fifteen hours, the whole is reduced to a fluid state. It is then taken out upon tubes, and blown into globes of nearly a foot in diameter. These globes being carried to the mouth of the oven, a longitudinal and nearly rectilineal crack is produced by touching it with cold iron, dipped in water. The globe is then opened on a smooth iron plate at the mouth of the furnace, and then forms a circular sheet of thin transparent window glass.

SILVERING OF MIRRORS.—This is performed by a mixture of tin and mercury, which combine in definite proportions and crystallize on the glass. The date of the discovery is uncertain, but, according to the best evidence, it proceeded out of Venice at a period when the alchemists were busy with metals, in the wild expectation to transmute them into gold. In searching for a chimera, they lighted upon a beautiful domestic invention. The Roman and Grecian mirrors were of tin or polished steel.

SKERRYVORE LIGHT-HOUSE.—This building is 120 feet high, the base is forty-two feet, and the top sixteen feet. The first stone of it was laid July 7, 1839, by the Duke of Argyll. The architect and engineer who built it is Mr. A. Stevenson, whose father erected the Bell Rock Light-house. The light was first exhibited Feb. 1, 1844. The foundation pit, which is in gneiss, is forty-two feet deep; to excavate this it required the labour of twenty men for 277 days, the firing of 296 shots, and the removal into deep water of 2,000 tons of material. Eddystone Light-house was built in 1696; Mr. Winstanley, the architect, perished in a storm there, a short period after it was erected.

ANTIQUITY OF THE USE OF GUANO AS A MANURE.—The introduction of guano, though comparatively of recent date in England, has long been known to the Spaniards. It is thus mentioned in a treatise by Dr. Albaro Alosono Barba, director of the mines of Potosi, translated by the Earl of Sandwich, 1669:—"Out of the islands in the South Sea, not far from the city of Arica, they fetch earth which manures the fields. It is called guano (*i. e.* dung—not because it is the dung of sea-fowls, as many would have it understood, but because of its admirable quality in making ploughed ground fertile. It is light and spongy; and that which is brought from the island of Iqueyque is of a dark grey colour, like unto tobacco ground small. From other islands, near Arica, they get a white earth, inclining to a sallow, of the same virtue. It instantly colours waters whereunto it is put, as if it were the best lye, and smells very strong. The qualities and virtues of this, and of many other simples of the New World, are a large field for ingenious persons to discourse philosophically upon, when they shall bend their minds more to the searching out of truth than riches."

INTRODUCTION OF GAS.—The earliest application of gas light on a large systematic scale was made at Manchester, where an apparatus for lighting the great cotton-mills of Messrs. Phillips and Lee was fitted up in the years 1804 and 1805, under the direction of Mr. Murdoch. A quantity of light nearly equal to 3,000 candles was produced on this occasion.

TRAFFIC OF THE GRAND JUNCTION CANAL.—According to statistical accounts which have been published, the goods traffic on the Grand Junction Canal has much increased since the opening of the London

and North-Western Railway. The quantity carried in 1847 amounted to 1,163,466 tons; the average annual amount of goods carried the twelve years subsequent to 1836 was 1,039,333 tons, while three years prior to 1836, before the line was opened, but 756,894 tons were moved on the canal. The dividends received by the Grand Junction Canal for the last forty years have averaged £9. 10*s.* 9*d.* per cent. per annum.

ANCIENT CLOCK.—The earliest clock with a balance of which we have any distinct account was made by Henry de Wyck, or De Vick, a German artist, for Charles V., king of France, and set up in the tower of his palace, about the year 1364.

SIMPLE METHOD OF EXTINGUISHING FIRE.—Mr. Cadet Vaux says, the best method of extinguishing a fire in a chimney is by throwing on the coals in the grate some flour of sulphur, which, combining with the oxygen, forms sulphurous acid, and being a non-supporter of combustion, as it passes up the chimney puts out the fire.

LARGE BELLS.—Bells were first introduced about A.D. 400, at Nola, in Campania—hence the term "Campanology" has been applied to the art of bell-ringing. The largest bell that was ever founded is that of Moscow. It has never been suspended, but lies in a deep pit at the Kremlin. The circumference is 67 feet 3½ inches, and the height 21 feet 4½ inches, and the thickness, at the thickest part, 23 inches; its weight has been computed at 443,772 lbs., which, at the rate of 2*s.* 6*d.* per lb., will amount to the sum of £55,471. 10*s.* lying unemployed, and of use to no one. It was cast at the expense of the Empress Anne, in the year 1735. In England the largest bells are those at Christ Church College, Oxford, which weighs 17,000 lbs.; St. Paul's, London, 11,474 lbs.; and the "Great Tom," of Lincoln, 10,954 lbs.

OLD SUSPENSION BRIDGE.—One of the first suspension bridges was built over the river Tees, in 1741, to form a communication between the counties of Durham and York. Hutchinson thus describes it, in his *Antiquities of Durham*:—"There is a bridge suspended on iron chains, stretched from rock to rock, over a chasm near sixty feet deep, for the passage of travellers, principally miners. The bridge is seventy feet in length, and little more than two feet broad, with a hand-rail on one side, and planked in such a manner that the traveller experiences all the tremulous motion of the chain, and sees himself suspended over a roaring gulf, on an agitated and restless gangway, to which few strangers dare trust themselves."

VARIATION IN THE WEIGHT OF LEAD.—The fodder of lead varies in different localities. In Derbyshire the fodder of lead consists of 23½ long cwts. of 120 lbs., or 2,820 lbs. In shipping it in vessels on the Trent, it is put on board by the fodder of 2,408 lbs.; the invoice is made after that. On the arrival in the Thames, the fodder is weighed at 2,184 lbs. For the Hull market it is reckoned at 2,340 lbs. The customs duties are invariably payable on the fodder of 2,240 lbs.

INVENTION OF THE COINING-PRESS.—The coining-press, or mill, is of French origin, and is generally ascribed to Antoine Broucheur, an engraver, who, in 1533, first tried it in the French king's (Henry II.) palace, for the coining of counters. It continued in use till 1585, in the reign of Henry III., when it was laid aside, on account of its being more expensive than the hammer coinage. It remained in disuse until 1623, when Briot, a French artist, unable to persuade the French Government to adopt it, came over to England. It was not, however, finally brought into use before 1662; previous to that period, the money in circulation was made by forging or hammering slips of gold and silver to the proper degree of thickness, then cutting a square from the slip, which was afterwards rounded, and adjusted to the weight of the money to be made; after which the blank

pieces of money were placed between two dies, containing the design of the coin, and the upper one was struck with the hammer. The money was necessarily imperfect, from the difficulty of placing the two dies exactly over each other when the blank piece was between them, as well from the improbability of a man being able to strike a blow with such force as to make all parts of the impression equally perfect.

Dutch Manufacture of false Gold-leaf. — This is made of brass, covered with gold. The brass is reduced to a fine thin riband by laminating, in the same manner as the gold. The riband is then gilded by the wash-gilding process, and afterwards cut into pieces, which are beat into leaves by the same means as are used for gold-beating, but the extension is not carried so far, because there is the less inducement to make the leaves thin. It is difficult to distinguish this from true gold when new, but it very soon tarnishes, and wholly loses its colour, which renders it unfit for any other kinds of gilding than those which are to be varnished over.

Boiling Springs of the Geysir, in Iceland.—In a plain, about eight miles in breadth, extending from the foot of the Blafell to the sea-shore, and connecting itself with the flat moorland of the coast, lie the springs of the Great Geysir, at the foot of a hill, composed of slaty phonolite and grey trachyte. According to all appearance, this plain, which has scarcely a perceptible inclination to the sea, was once a broad fiord, reaching as far as the jagged mountains of the Yarlhettur and the Blafellshals. It is clothed with a thick green carpet of meadow-ground, and many larger or smaller springs wind like silver ribands through the grass, sometimes hiding between high banks, then again coming in sight. To the east and south-east are seen ranges of flat hills and mountains, among which can be distinguished the cone of Hecla; on the opposite side, behind the Laugafell, the Byrnafell, higher and steeper, and mostly veiled in dark blue clouds, clothed at its foot with grass, but at the summit showing naked crags, on which lie bare strata of trap-rock and palagonite. From a considerable distance the traveller perceives, at the foot of the Laugafell, light clouds of steam rising out of the ground, or sometimes thick columns of smoke whirling upwards in the air; but he soon finds himself in the midst of a complicated system of boiling springs, which break forth from a volcanic chasm, extending in the direction of north-north-west. The valley of the Geysir is mostly filled with a new alluvium, which has here and there undergone a subsequent elevation, extending northwards from the spring in a broad ridge. Through this soil, which has been gradually overlaid by a thick stratum of *kieselsinter*, the deposit from the springs, the Geysir bursts forth, and from the horizontal beds of this deposit there has formed, in various proportions round the Geysir and smaller fountains, a flattened cone, in the midst of which is a perpendicular cylindrical funnel, of larger and smaller diameter. In ordinary circumstances, the basin of the Geysir is filled with crystal-clear sea-green water, of the temperature of 82° (centigrade), and it flows in three small channels over the eastern slope of the cone. After some time, a sound, as of subterranean thunder, can be distinguished, resembling that made by a volcano during an eruption, and then a slight tremulous motion may be perceived on the rim of the fountain. When this has lasted some seconds, it ceases, perhaps for a time, and then begins again with increased force; the water in the basin begins to swell, and the surface becomes convex, and at the same time great bubbles of steam rise to the surface, and burst, throwing up the boiling water some feet high. Then it is again still, and the whole fountain is enveloped in clouds of steam. This phenomenon is repeated at regularly-recurring intervals of an hour and twenty minutes to an hour and a half—perhaps for a day—until it suddenly assumes a different character. A heavier thunder is heard below; the water swells violently, and

begins to heave and dash in the strongest agitation; and, after a few minutes, there shoots up a column of water, dispersing at the summit into dazzling white foam; this has scarcely reached a height of from eighty to a hundred feet, when, before its drops have had time to fall to the ground, a second and third follow, and rise still higher. Larger and smaller jets now shoot forth in all directions, some sideways in arches, others perpendicularly upwards, with a loud hiss, like that of a rocket—enormous clouds of steam roll upwards; then comes a loud detonation from below, followed by another column of water higher than any of the preceding ones, and mingled with stones; and after the phenomenon has lasted for a few minutes, the whole falls, and vanishes like the fantastic pageantry of a dream. Before the clouds of steam have had time to disperse, or the boiling water to run off the sides of the cone, the basin, which had seemed full to the brim, appears almost dry, the water having sunk nearly three feet.

INCREASE OF COAL CONSUMPTION IN LONDON. — The records of the London Custom-house having been destroyed by fire, it is impossible to obtain many of the statistical details of trade; but it happens that the writer of a history of London, above 100 years ago, obtained from the Custom-house, at that time, an account of seven years' importations of coal into London. The preservation of this account enables us to give the following comparative statement of the importations into London for a period of above 100 years:—

YEARS.	TONS.	YEARS.	TONS.
1726	632,470	1826	2,103,498
1727	533,815	1827	1,874,610
1728	710,223	1828	1,893,083
1729	658,744	1829	2,095,420
1730	610,313	1830	2,116,023
1731	633,893	1831	2,053,673
1732	600,757	1832	2,149,820

In 1838, the importation had increased to 2,582,770 tons; in 1845, to 3,461,199 tons; and in 1848, it amounted to 3,418,340 tons.

LIST OF PATENTS FOR 1849.

JANUARY.

AINE, J. B. F. M., impts. steam-engines

BARBERIS, A., impts. in spinning and winding

BARLOW, H. B., impts. in the manufacture of cut-piled fabrics

BARLOW, W. H., impts. perm. ways for railways

BESSEMER, H., impts. in the manufacture of glass

BETTS, W., impts. in capsules

BLAKE, O., impts. in ventilation

BOGGETT, W., impts. in obtaining motive power

BOTTOM, J. F., and DUNNICLIFF, J. D., impt. in dressing fabrics

BROOMAN, R. A., impts. in artificial limbs

BROWN, S., impts. in measuring liquids

BUCHLER, E., impts. in boots and shoes

CALVERT, F. A., imps. in cleaning wool

CASTLEY, J., improvements in the manufacture of varnishes, &c.

DE BERGUE, C., impts. in steam-engines, &c.

DUGDALE, R., impts. in hardening iron

FRANCIS, H., impts. in cutting wood

GIBSON, J. G., impts. in spinning

GODEFROY, P. A., impts. in dressing woven fabrics

GOUGY, P. F., impts. in moving heavy bodies

GREENHOW, C. H., impts. in atmospheric railways

HADDAN, J. C., impts. in railway wheels

Hamilton, J., impts. in cutting wood
Hobler, F., impts. in capstans and windlasses
Johnson, R., impts. in brewing and fermentation
Kenworthy, W., impts. in looms for weaving
Knapton, W., impts. in gasometers
Laming, R., impts. in obtaining sulphuric acid
Loam, M., impts. in fuzees
Martin, W., impts. in figuring textile fabrics
McClellan, C., an improved corn-mill
Moat, W. C., impts. in steam-engines
Munn, R., impts. in looms for weaving
Needham, H., impts. in fire-arms
Newcomb, T., impts. in furnaces
Newton, W. H., impts. in wheels
Nickels, impts. in manufacture of caoutchouc
Paris, C. H., impts. in preventing the oxidating of iron
Pim, W., impts. in propelling vessels
Reece, R., impts. in treating peat
Riepe, E., impts. in the manufacture of soap
Robinson, T., impts. in spinning, combing, &c.
Rowe, W., impts. in uniting glass or earthenware pipes
Shaw, R., and Cottam, S. F., impts. in spinning
Slaughter, E., impts. in marine steam-engines
Stewart, D. Y., impts. in casting iron
Thomas, W., impts. in window-blinds
Tyler, J. T., impts. in hats, caps, &c.
Urwin, R., impts. in steam-engines
Walker, W., impts. in machine for cleaning roads
Wilkins, A., and Stacey, W., impts. in heating and boiling liquids
Williams, G., impts. in furnaces
Wright, S. W., impts. in spinning
Wrigley, M., impts. in the manufacture of yeast

FEBRUARY.

Barker, J., impts. in umbrellas and parasols
Barnes, J., impts. in bleaching
Biram, B., impts. in miners' lamps
Blake, O., impts. in the manufacture of glass
Bottomley, J., impts. in weaving
Brewer, W., and Smith, J., impts. in producing water-mark on paper, &c.
Brindley, W., impts. in waterproof paper
Brown, R., impts. in perforating and riveting
Browne, J., impts. in rigging vessels, and in railways
Carteron, J. A., impts. in dyeing
Chandois, A., impts. in extracting colouring matters
Clarkson, T. C., impts. in the application of leather, India-rubber, &c.
Crossley, H., improved method of heating and lighting
Cutler, J., impts. in metal pipes or tubes
David, P. I., impts. in bleaching
Day, W. C., impts. in machine for weighing
De Bourcicault, D., impts. in distributing fluids
Donisthorpe, G. E., and Milnes, J., impts. in stopping steam-engines
Erwood, J., impts. in paper-hangings
Fisher, H., impts. in coke-ovens, heating, &c.
Forlong, R. P., impts. in castors for furniture
Giblett, J., impts. in woollen cloth
Harris, W., impts. in preparing leather
Harrison, J. W., and Oddie, J., impts. in looms for weaving
Hick, J., and Gratrix, W. H., impts. in steam-engines and propelling
Hill, L., impts. in the manufacture of iron
Jacob, C., impts. in earthenware pipes
Kurtz, C. A., impts. in looms for weaving
Lord, E., impts. in preparing fibrous substances
Newton, E., impts. in engines
Newton, E., impts. in polishing grain
Nickels, C., impts. in woollen and other fabrics
Palmer, J., impts. in lucifers and match-boxes
Parish, H. H., impts. in lamps and gas-burners
Parsons, P. M., impts. in railways, engines, &c.
Patinson, H. L., impts. in compound of lead
Pearce, C. T., impts. in light by electricity
Pinchbeck, E. G., impts. in steam-engines
Pollard, R., improved machinery for making rope
Remond, A. F., impts. in envelopes
Rochaz, C. A. F., impts. in oxide of zinc, &c.
Rowlandson, T., impts. in the treatment of mineral waters
Sleigh, W. W., impts. in preventing accidents on railways
Snowden, T., impts. in artificial fuel
Sturges, R. F., impts. in candlesticks, lamp-pillars, &c.
Taylor, J., impts. in fencing-walls
Tooth, W., impts. in water-closets, &c.
Townsend, M., and Moulden, D., impts. in the manufacture of looped fabrics
Webster, J., impts. in manufact. gas
Whitworth, C. F., impts. in preventing accidents on railways
Willson, G. F., impts. in separating fatty matters

MARCH.

BAIRD, J., and WHITELAW, A., impts. in the manufacture of iron
BANKS, S., impts. in mills for grinding
BECKETT, W., and POWELL, S., impts. in wearing apparel
BERANGER, J., impts. in weighing-mach.
BRAGG, A., impts. in propelling by atmospheric pressure
BRITTEN, J., impts. in cooking apparatus
BROOKE, J. W., impts. in lamps
BUCKWELL, W., impts. in compressing food
CHAUFFOURIER, P. A., impts. in watches
CLARKE, T., and MOTLEY, T., impts. in motive power
DE BARROS, J., impts. in machinery for making lasts and other irregular forms
DE FONTAINEMOREAU, P. A., Le Comte, impts. in coating metallic bodies
DEFRIES, N., and PETTIT, G. B., impts. in applying gas for heating purposes
FLETCHER, J., and FULLER, T., impts. in machinery for planing and cutting metal
GRATRIX, W., impts. in woven fabrics
GREEN, W. H., impts. in the preparation of fuel
GREEN, C., and NEWMAN, J., impts. in railway wheels
GUERIN, P. R., impts. in steering vessels
HAIL, S., impts. in the combust. of fuel
HARRISON, T., impts. in ovens
HARTLEY, W., impts. in steam-engines
HENDERSON, D., impts. in metal castings
HOWARD, H., impts. in manuf. of glass
JENNINGS, H. C., impts. in manufacturing pigments and white lead
KNOX, G., impts. in railway carriages
LAWRENCE, J., impts. in brewing and storing liquids
MACINTOSH, J., impts. in furnaces and motive power
MANTON, G. H., and HARRINGTON, J., impts. in fire-arms
MASON, J., and COLLIER, G., impts. in machinery for spinning
MCDOUGALL, A., impts. in treating woollen and other fabrics
MOORE, R. R. R., impts. in letters for shop-fronts
NEWTON, A. V., impts. in piled fabrics
NORTON, F. W., impts. in figured fabrics
PARKES, A., impts. in treating metals
PARKINSON, W., impts. in gas and water meters
PAYNE, W., impts. in clocks and watches
PICKERING, W. H., impts. in evaporating fluids
PLUMMER, R., impts. manuf. of flax, &c.
REYNOLDS, O., impts. in railways
RUSSELL, T. H., and WOOLRICH, J. S., impts. in coating metals
SATCHELL, R., impts. in depositing seeds, &c.
SHANKS, A., an improved mode of giving form to metals
SIEMENS, C. W., impts. in steam-engs.
SMITH, J., impts. in the manuf. of flour
SWAN, A., impts. in heating apparatus
THOMSON, F. H., impts. in smelting ores
THOMSON, G., and ELMS, J., impts. in making fire-wood
VOUILLON, F., impts. in hats, caps, &c.
WESTHEAD, E., impts. manuf. waddings
WHITE, S., impts. in furnaces and manufacture of gases
WILSON, G. F., impts. in candles, &c.
WILSON, J. T., impts. in sulphuric acid

APRIL.

ALLIOTT, A., impts. in registering the force of water, steam, &c., and the velocity of carriages
BARSHAM, J., impts. in separating the fibre from cocoa-nut husks
BENIOWSKI, B., impts. in printing
BESSEMER, H., impts. in manuf. sugar
BRANDT, G., impts. in railway engines and carriages
BROQUETTE, C. A., impts. in printing and dyeing
BURKE, W. H., impts. in the preparation of gutta percha and caoutchouc
CARPENTER, S. A., impts. in buckles
CHILDS, J., impts. in candles
CLEGG, R., HENDERSON, J., and CALVERT, J., impts. in looms
COCKSEY, T., and NIGHTINGALE, J., impts. in machines for cleansing, dyeing, and printing
DUNINGTON, H., impts. in looped fabrics
FAULCONBRIDGE, W., impts. in hose-pipes, &c.
GARNIER, A., impts. in extracting colouring matters
GEACH, C., and WALKER, T., impts. in axletrees and shafts (ext. of four yrs.)
GORDON, R., impts. in ventilating mines
GREENING, T. N., impts. in knives and forks
HORSLEY, J., impts. in preventing incrustation in boilers
ILES, C., impts. in producing ornamental surfaces
KENNINGTON, G., impts. in steam and hydraulic engines
KILNER, W., impts. in wheels and axles
KNAPP, W. H., impts. in matches and firewood
LITTLE, W., impts. in lubricating machinery
MCBRIDE, W., impts. oxygenating water
NEWTON, A. V., impts. in assorting solid materials
NEWTON, E., impts. in the manuf. of lace
NEWTON, W. E., impts. in boilers
ORMEROD, J., impts. carding cotton, &c.
OXLAND, R. and J., impts. in manufacture of sugar
PARRY, W., impts. in horse-shoes
PHILLIPS, W. H., impts. in extinguishing fire
PIRON, L. P. N. D., impts. in pipes and tram-roads

Ruthven, J., impts. producing pressure
Shepherd, —, impts. in electric clocks and telegraphs
Simpson, G., and Forster, T. in treating gums, &c.
Thompson, T. H., impts. reservoirs, &c.
Verney, L., impts. in preserving vegetable and animal substances
Wilson, J. G., and Pidding, W. impts. in furnaces and fire-places
Woollett, A., impts. in gun-carriages

MAY.

Allport, S., impts. in looms
Bessemer, H., and Heywood, J. S. C., impts. in treating oils, &c.
Buller, T. W., impts. manuf. earthenw.
Colegrave, F. E., impts. in signals on railways
Crosse, A., impts. in tanning
Da Costa, S. I., impts. in vessels, &c.
Dalton, J., impts. printing calicoes, &c.
De Chatauvillard, L. A., impts. in fire-arms
De Fontainemoreau, P. A., Le Comte, impts. in weaving
Dodge, G. H., impts. in spinning, &c.
Donisthorpe, G. E., and Whitehead, J., impts. in combing and hackling fibrous matters
Dugdale, J., and Birch, E., impts. in propelling vessels
Goodfellow, T. and G., impts. in preparing plastic materials
Grundy, E., and Farrow, J., impts. in spinning
Hodges, R. E., impts. in mechanical purposes
Kennedy, M., impts. in packing
Munkiltritch, A., impts. in lubricating machinery
Newton, W., impts. in the Jacquard machine
Parker, W. P., impts. in pianofortes
Poole, M., impts. in drawing fluids from the human body
Reece, R., and Price, A. P., impts. in the manufacture of sugar
Smith, A., impts. in rope and cordage
Smith, C., impts. in wearing apparel
Smith, D., impts. in the manuf. of lead
Steiner, F., impts. in Turkey red dye
Sutcliffe, R., impts. in spinning
Thorn, J., impts. in drying and bleaching
Waller, S., impts. in weaving
Whaley, T., and Lightoller, R. A., impts. in the manufac. of bricks & tiles
Wilkes, S., impts. in handles and knobs for doors
Wilson, J., impts. in trusses
Wilson, J. G., impts. in manuf. of glass

JUNE.

Anthony, C. J., impts. in treating animal matter
Barlow, P. W., impts. in permanent ways of railways
Berthon, E. L., an instrument to show the speed of vessels, &c.
Bessemer, H., impts. in raising fluids
Birley, T. H., impts. in spinning (extension for five yrs. from 27th May)
Bovill, G. H., impts. in manufacture of meal and flour
Brooman, R. A., impts. in filling bottles
Browne, T. B., impts. in looms
Burch, J., impts. in printing
Burton, B. A., impts. in bricks, tiles, &c.
Campbell, A. F., impts. in wheels, steam-boilers, &c.
Colt, S., impts. in fire-arms
Denison, J. W., impts. in engines
Dunn, S., impts. in constructing tunnels
Field, O., impts. in anchors
Forster, J. T., impts. in building ships
Goose, W., impts. in making nails
Gray, T. W., impts. in water-closets, &c.
Griffin, C. J. C., impts. in military accoutrements
Haines, M. J., impts. in packing, &c.
Hebson, D., impts. in steam-engines
Hertz, B., impts. in fountain pens
Houston, J., impts. in obtaining motive power
Hulot, J., impts. in shirt fronts
Jacob, W. C., impts. in parasols and umbrellas
Jowett, T., impts. in looms
Knight, H., impts. in printing and embossing
Laurent, V. H., impts. in looms
Lawes, T., impts. in obtaining motive power
Leadbetter, J., impts. in raising water
Masters, T., impts. in appar. for cooking
Merchant, T., and Harland, R., impts. in railway carriages
Miller, D., an improved method of drawing ships up an inclined plane
Nasmyth, J., impts. in machinery employed in dyeing, printing, &c.
Neilson, W., impts. in moving heavy bodies
Newton, W. E., impts. heating buildgs.
Nickels, C., impts. in manufacturing woollen fabrics
Payne, E. J., impts. in marine vessels, and in machinery for moulding figures
Payne, J. E. H., and Currie, H. W., impts. in the manufacture of coach-lace
Picault, G. F., impts. opening oysters
Poole, M., impts. in pistons, valves, brewing, &c.
Preddy, W., impts. in watch-keys
Ritchie, W. H., impts, in fire-arms
Samuda, J., impts. in obtaining motive power
Simpson, G., impts. in machines for moving heavy bodies
Slack, E., impts. in textile fabrics
Smith, S. B., impts. in motive power
Smith, W. H., impts. in breakwaters
Steel, J., and Emerson, B., impts. in power-looms

STOWE, H. M., impts. blocks and sheaves
THORNEYCROFT, G. B., impts. in railway tyres, &c.
TREWHITT, H., and CRAMPTON, T. R., impts. in steam-engines
WILSON, R., impts. in steam-engines, boilers, &c.
WILSON, W., impts. in cutting tubes or tiles
WOODS, E., impts. in turntables

JULY.

BAILEY, H., impts. in wearing apparel
BOWDEN, J., and LONGMAID, W., impts. in the manufacture of soap
BROOMAN, R. A., impts. in steam generators
BROTHERHOOD, R., impts. in railway trucks
BROWN, W. H., impts. in rolling iron
BROWN, W., MAPPLE, H., and WILLIAMS, N., impts. in electricity and electric clocks
BROWNE, J., impts. in stoves and grates
BUSH, W., impts. in lamps and lighting
CHAUFFOURIER, P. A., impts. in castors
COMBE, J., impts. in carding and winding flax, &c.
COTTAM, G. and E., impts. in machine cutting, &c.
FULLER, E. I., and TABERNACLE, G., impts. in carriage springs
GARRETT, R., impts. in thrashing machinery, and steam-engine
GOODIER, J., impts. in grinding grain
GRANTHAM, J., impts. in sheathing ships
GREENWOOD, T., and PARKER, F., impts. in filtering liquids
HOLLAND, J., a new mode of making steel
HOLT, J., impts. in machinery for preparing fibrous substances
HOW, A. P., instrument for ascertaining the saltness of water in boilers
KNOWLES, Sir F. C., impts. in manufact. iron and steel
LAURIE, W., impts. in furniture and travelling apparatus
LEIGH, E., impts. in steam-engines
LISTER, S. C., and DONISTHORPE, G. E., impts. in preparing and spinning wool
MULBERY, J., impts. in steam valves
PLANT, R., impts. in manufacturing iron
ROBINSON, J., impts. in moving weights
ROBINSON, G. A., and LEE, R. E., impts. in ovens and furnaces
ROSE, A. F., impts. in printing
SUMMERS, T. S., impts. in fastening sacks
THOMSON, R. W., impts. in drawing instruments
USHER, J., impts. in tilling land
WALKER, T., impts. in boots and shoes
WEARE, R., and PIGGOTT, W. P., impts. in electricity
WILDING, W. H., impts. in obtaining motive power
WOODS, J., impts. in bleaching organic substances

AUGUST.

AINGWORTH, B., impts. in ornamenting metals
BAXTER, G., impts. in printing in colours (extension for five years)
BERTRAND, I., impts. in carriages
BLAKE, J., impts. in lamps
BODMER, F. W., impts. in letter-press printing
BOUCHER, E. A. D., impts. manuf. cards
BROOMAN, R. A., impts. in extracting and evaporating substances
CHAMIER, F., impts. in ships' blocks
COWPER, C., impts. in steam-engines and lowering weights
DAY, R. K., impts. in scouring fabrics
DE CAVAILLON, F. J., impts. in obtaining and applying hydrogen gas
DRIEN, J. A., impts. in wearing apparel
DUNN, A., impts. in making soap
FURNESS, W., impts. in machinery for cutting wood
GEEVES, W., impts. in making boxes
HARCOURT, D., impts. in mak. hinges, &c.
HARRINGTON, G. F., impts. in artificial teeth
HOLDSWORTH, A. H., impts. in marine boilers
KNAB, D. C., apparatus for distilling fatty matters
KNOWLYS, J., impts. in obtaining and applying vegetable products
LEMAITRE, L., impts. in ferules
MACFARLANE, M., impts. in finishing woven fabrics
MOREY, C., impts. in embroidery and stitching
MURDOCH, J., impts. in ventilating ships and evaporating liquids
NEWTON, A. V., impts. in raising heavy bodies
NEWTON, A. V., impts., in refining sugar
NEWTON, W. E., impts. in steam-boilers
PARKINSON, J., impts. measuring liquids
PECQUEUR, G., impts. in nets
POTTS, T., impts. appar. for curtains, &c.
PRIDEAUX, T. S., impts. in furnaces and steam-boilers
ROBINSON, J., impts. in manufacture of orchil and cudbear
ROELM, A., impts. in making roads and covering floors, &c.
ROGERS, J. E. D., impts. in manufacture of white lead
RUTHVEN, J., impts. in propelling vessels
SHAW, J., impts. in air-guns
THOMAS, W., and MARSH, J., impts. in stays and other parts of dress
THOMPSON, B., impts. in the manufacture of iron
YOUNG, J., impts. in treating metals
YULE, A., and CHANTER, J., impts. in coating ships, &c.

SEPTEMBER.

AITKEN, J., impts. in machinery for dressing cotton, flax, &c.

Attwood, H., and Renton, J., impts. in farinaceous substances
Bessemer, H., impts. in prep. of fuel
Blashfield, J. M., impts. in manure
Boggett, W., impts. in heating and evaporating fluids
Brooman, R. A., impts. in saddlery
Brown, D. S., impts. fumigating plants
Browne, W., and Veale, R. R., impts. in preparing ores, minerals, &c.
Chameroy, E. A., impts. in railways, &c.
Cooper, J. R., impts. in fire-arms
Edwards, D. O., impts. in radiating heat
Galloway, E., impts. in furnaces
Goodfellow, B., impts. in stm.-engines
Griffiths, R., impts. in steam-engines
Griffiths, T., impts. in tea-pots, &c.
Haig, A., impts. in driving atmospheric air
Handley, W., Duncan, G., and Mc Glashan, A., impts. in railway breaks
Heath, J. M., impts. in manuf. steel
Heywood, E., impts. in weaving
Higgins, J., and Whitworth, T. S., impts. in spinning
Higgins, J., and Whitworth, T. S., impts. in machinery for dressing flax, cotton, &c.
Hosking, J., an improved pavement
Lorkin, J., impts. in treating gelatinous substances
MacNeill, Sir John, and Barry, T., impts. in locomotive engines
Maillard, N. D., impts. in propelling
Marsden, C., impts. in drain-traps
Marsden, T., impts. in machinery for combing and dressing flax
Mason, J., and Collier, J., impts. in machinery for dressing cotton, &c.
Meadows, J., impts. in veneering
Newton, W. E., impts. in pumps
Newton, W. E., impts. in furniture
Parkinson, W., impts. in gas-meters
Pearce, W., and Evans, E., impts. in steam-engines
Potter, J., impts. in spinning
Preterre, N. P., impts. in coffee and tea-pots
Staite, E., and Petrie, W., impts. in electric lighting
Terry, A. R., impts. in manuf. fire-wood
Vauldy, J. B., impts. in dyeing silk
Warren, J., and Mongeine, T., impts. in the construction of bridges, &c.
Wren, B., impts. in cleaning grain

OCTOBER.

Brandt, W. G., impts. in railway carriages
Browne, T. B., impts. in looms
Christie, D., impts. in welding cast iron with steel and wrought iron
Clegg, R., Henderson, J., and Calvert, J., impts. in looms for weaving
Combe, J., impt. in carding machinery
Dodge, G. H., impts. in machinery for cotton-spinning
Edwards, D. O., impts. in gas
Finzel, W., impts. in sugar machinery
Godlin, J., impts. in mills
Grapel, E., impts. in marine vessels
Holland, J., a new mode of making steel
Jamieson, W., impts. in looms for weaving.
Lightfoot, T., impts. in printing cotton
Macindoe, G. P., impts. in machinery for cotton-dressing, &c.
Mercer, J., and Blythe, W., impts. in dyeing
Newton, W. E., impts. in carpenters' machinery
Norton, F. W., impts. in fancy fabrics
Parkes, A., impts. in alloys
Plumer, R., impts. in machinery for dressing fibrous materials
Ritchie, W. H., impts. in fire-arms
Robertson, J., impts. in machinery for raising weights
Shepherd, C., and Shepherd, C., jun., impts. in clocks and chronometers
Stovel, J., impts. in coats

NOVEMBER.

Ador, A., impts. in producing light
Amoss, C. E., and Clark, M., impts. in the manufacture of paper
Barker, C. M., impts. in sawing wood and metals
Barlow, A., impts. in weaving
Barlow, A., impts. in pigments
Barlow, P. W., impts. in railways
Barrow, J., impts. in axles for railway carriages
Brindley, W., impts. in papier-maché
Buckwell, W., and Apsey, J., impts. in steam-engines
Buckwell, W., impts. in pipes
Buckwell, impts. in compressing fuel
Calloway, G., and Purkis, R. A., impts. in the propulsion of vessels
Chambers, E., impts. in wheels
Chesterman, J., impts. in drilling-instruments
Combe, J., impts. in machinery for dressing flax
Cotton, A., firm of J. Elce & Co., impts. in machinery for spinning cotton
Cowley, J., and Hickman, J., impts. in the manufacture of bedsteads, &c.
Cowper, C., impts. in the treatment of coal, &c.
Cowper, C., impts. in the manufacture of sugar
Cowper, C., impts. in forging iron
Crosley, H., improved mode of drying
Crum, W., impts. in woven fabrics
De Changy, C. E. F. C. P., impts. in preparing fibrous substances
De Fontainemoreau, P., impts. in weaving
Donisthorpe, G. E., and Milnes, J., impts. in machinery for stopping steam-engines

Donisthorpe, G. E., and Whitehead, J., impts. in preparing fibrous matter
Duburquet, F. J., impts. in hydro-pneumatic-engines
Dupperny, L. A., impts. in machinery for figures in relievo
Gillard, J. P., impts. in the production of heat
Gordon, J., impts. in ships
Haines, M. J., impts. in bands for machinery
Hancock, J. W., impts. in the manufacture of hosiery goods
Henson, J. H., impts. in railways
Hills, F. C., impts. in the compression of peat
Holt, J., impts. in machinery for dressing cotton
Keely, T., and Wilkinson, W., impts. in elastic fabrics
Knight, H., impt. in printing machinery
Knowles, T. J., impts. in the mixing of vegetable and mineral products
Lamplough, H., new mode of supplying water
Le Gras, L. N., impts. in disinfecting manure
Lowe, J., impts. in grates
Meinig, C. L. A., impts. in galvanism
McDougall, A., impts. in recovering useful products from water used in washing cotton fabrics
Morris, W., impts. in preparing clay
Macindoe, G. P., impts. in machinery for twisting flax
Newry, J. G., and Newman, J., impts. in button-studs
Newton, W. E., impts. in steam-boilers
Newton, W. E., impts. in boring instruments
Newton, A. V., impts. in manufacturing leather
Oliver, S. B., impts. in dyeing
Palmer, F. O., impts. in candles
Parkinson, J., impts. in meters for liquids
Parnell, R., impts. in sewing woollens
Pownall, J., for an improved odometer
Rufford, F. T., Marsorn, I., and Finch, J., impts. in the manufacture of baths
Stocker, S., impts. in beer-engines
Sturges, R. F., and Harlow, J., impts. in bedsteads
Taylor, W. G., impts. in linting machines
Tucker, W., impts. in the manufacture of mantel-pieces
Vidie, L., impts. on conveyances by land and water
Westhead, J. P., impts. in the manufacture of fur
Wilson, J. B., impts. in wire rope
Worsdell, T., impts. in the manufacture of envelopes
Yule, A., Chanter, J., and Terrace, A., impt. in materials for coating ships

DECEMBER.

Ackroyd, W., impts. in dressing worsted
Berthon, E. L., impts. in discharging water from ships
Bickmyre, impts. in the manufacture of sugar
Buchannan, G., impts. in the manufacture of stop-cocks
Carter, E., impts. in printing calico
Christie, J. H., impts. in the manufacture of wrought-iron wheels
Christie, D., impts. in machinery for wool
Cowper, C., impts. in steam-regulators
Dalton, A., impts. in furnaces
Davies, J. & G., impts. in steam-engines
De la Rue, W., impts. in envelopes
De Strubing, Baron, impts. in axles of railway carriages
Donisthorpe, G. E., impts. in wheels of locomotives
Ecarnot, J. B., impts. in mineral acids
Fairbairn, P., and Hetherington, J., impts. in machinery for fibrous substances
Fawcett, B., impts. in pigments
Fisher, S., impts. in railway carriages
Grimsby, T., impts. in the manufacture of bricks
Hackworth, T., and Hackworth, J. W., impts. in locomotives
Harcourt, R., impts. in handles of doors
Hobson, R., impts. in horse-shoes
Holt, W., impts. in musical instruments
Jenkinson, J. H., and Priestly, T., impts. in machinery for fibrous materials
Lizars, C., impts. in gas-meters
Marchant, J., and Harland, R., impts. in railway carriages
Montgomery, C., impts. in brewing
Naysmith, J., impts. in machinery for textile fabrics
Oldknow, J., impts. in the manufacture of lace
Paridis, J., impts. in the manufacture of elastic cushions
Presti, Baron L., impts. in hydraulic presses
Pulvermacher, I. L., impts. in galvanic batteries
Roberts, H., impts. in the manufacture of bricks
Shute, T. R., impts. in silk-throwing
Smith, J., impts. in treating the fleeces of sheep
Spray, F., and Nevett, G., an improved steam-engine
Talbot, H. F., and Malone, T. A., impts. in photography
Thompson, F. H., and Varnish, E., impts. in the manufacture of inkstands
Whitworth, J., impts. in machinery for cutting metals
Wythes, G., impts. in rails

PATENTS ASSOCIATED WITH MINING granted from January 1 to December 31, 1849.

Aingworth, Metals .... Aug. 1
Attwood, Iron .... Oct. 5
Banister, Boiler tubes........ Oct. 12
Barlow, Railways............ Nov. 14
Barlow, Pigment .... Nov. 29
Barrow, Axle and axle-boxes.. Nov. 24
Barker, Sawing and cutting .. Nov. 10
Bessemer, Fuel and furnaces.. Sept. 20
Boggett, Heating and evaporating .... Sept. 27
Bonell, Rotary engines, carriages, and vessels .... Oct. 12
Brandt, Bearings .... Oct. 11
Brooman, Steam generators .. July 4
Brooman, Extracting, drying, and evaporating .... Aug. 16
Brown, Rolling-mills .... July 4
Brown, Mapple, & Williams, Electric telegraphs and clocks July 18
Browne, Stoves .... July 4
Buchanan, Cocks, valves, and joints .... Dec. 3
Buckwell & Apsey, Steam-engines and propelling .... Nov. 2
Buckwell, Pipes and moldable articles .... Nov. 17
Buckwell, Compressing fuel.. Nov. 5
Campbell, Motive power and propelling .... Oct. 18
Chambers, Wheels .... Nov. 10
Chamier, Ships' blocks ...... Aug. 23
Chesterman, Drilling & boring Nov. 13
Christie, Uniting iron and steel Oct. 19
Christie, Wheels .... Dec. 10
Christophers, Naval architecture .... Oct. 12
Cottam & Cottam, Cutting and power of machines .... July 12
Cowper, Mine lifting machinery and steam-engines .... Aug. 23
Cowper, Coal .... Nov. 2
Cowper, Iron .... Nov. 24
Cowper, Indicator............ Dec. 15
Crosley, Heating and lighting Nov. 7
Cutler, Metallic tubes........ Aug. 28
Dalton, Furnaces .... Dec. 15
Davies & Davies, Power engines .... Dec. 10
Day, Weighing-machines...... Aug. 29
Deeley, Ovens and furnaces .. June 13
De Strubing, Bearings & alloys Dec. 3
Donisthorpe & Mines, Apparatus for stopping steam-engines .... Nov. 17
Donisthorpe, Wheels........ Dec. 3
Dreburguet, Hydro-pneumatic engines .... Nov. 22
Ecarnot, Sulphuric and other acids and nitrates............ Dec. 10
Edwards, Application of gas .. Sept. 20
Fawcett, Paints .... Dec. 15
Findlay & Wilkie, Turning, cutting, shaping, and reducing Aug. 10
Fisher, Railway-carriages, &c. Dec. 5
Furness, Sharpening tools, and welding steel to cast iron .... Aug. 9
Galloway, Furnaces .... Sept. 20
Geeves, Boxes .... Aug. 1
Gillard, Heat and light ...... Nov. 22
Goodfellow, Steam-engines.. Sept. 13
Goodier, Mills .... July 9
Grantham, Sheathing ships .. July 4
Grapel, Marine vessels, moulding, and gums .... Oct. 8
Greenwood & Parker, Filtering .... July 4
Griffiths, Steam-engines and propelling .... Sept. 13
Griffiths, Stamped metal articles .... Sept. 20
Grimsley, Bricks and tiles .... Dec. 10
Hackworth, Steam-engines .. Dec. 15
Haig, Motive power .... Sept. 6
Haines, Bands, hose, and buffers Nov. 2
Hamilton, Cutting wood .... June 28
Handley, Duncan, & Co., Railway breaks.................. Sept. 20
Harcourt, Vices, hinges, and metal .... Aug. 1
Heath, Steel .... Sept. 6
Henson, Railways and carriages July 18
Hills, Peat and gas .... Nov. 24
Holdsworth, Marine boilers and funnels .... Aug. 9
Holland, Steel .... July 18
Hulett & Paddon, Gas meters and regulators .... Oct. 18
Johnson & Cliffe, Furnaces.. Oct. 12
Knowles, Iron and steel ...... July 4
Knowlys, Mineral and vegetable substances, and generation of heat........................ Aug. 9
Knowlys, Application, removal, andcompression of atmospheric air .... Sept. 10
Leigh, Steam-engines .... July 18
Lo Presti, Hydraulic engines.. Dec. 10
Macneill & Barry, Locomotives and railways .... Sept. 6
Maillard, Motive power and propelling .... Sept. 27
Meinig, Galvanism and magnetism...................... Nov. 17
Moat, Steam, air, or gas engines July 16
Morris, Bricks and tiles ...... Nov. 2
Mulbery, Slide valves........ July 4
Murdock, Converting sea-water into fresh .... Aug. 1
Nasmyth, Regulating and driving power-machines.......... Aug. 24

PART IV.

Tabular and Statistical Matter.

WATER-WHEELS.

An easy method to calculate the power of a Water-wheel would be to add its diameter and width together, and then square the same. Multiply the contents by gallons of water contained in one bucket, which will give the number of lbs. weight the wheel is capable of lifting, allowing one-eighth for friction, thus:—Suppose a wheel 40 feet diameter with 4 feet breast, the buckets 42 inches in width, 13 inches deep, and 6 inches across—width and diameter 44 feet, which squared gives a result of 1,936, which again multiplied by 11¾ gallons, being the contents of one bucket, makes a total of 23,748 lbs. weight, from which deducting one-eighth for friction, leaves 20,780 lbs., or 10 tons 7 cwt. 2 qrs. 24 lbs. Assuming the bucket, exclusive of ring, at 42 inches, and depth of bucket 13 inches, with 6 inches width, the result would be 3,276, which divided by 277·3, being the cubical or solid inches contained in a gallon, gives 11 gallons 3 quarts to each bucket, as above stated. The power of the wheel would thus be, according to the rule laid down for estimates of this nature by Boulton and Watts, $103\frac{9}{10}$ horse-power, or in other words, 200 lb. horse to draw over pulley at rate of 224 feet per minute.

COLUMN OF WATER.

Rule to find weight of column of water, say 12 inches to a depth of 50 fathoms.—Square diameter, which will give 144 lbs. to the 3 feet, or 288 lbs. to the fathom, and at the assumed depth of 50 fathoms this multiplied would give 14,400 lbs., or nearly 6½ tons, as the weight to be raised.

RULE TO FIND STROKE IN SHAFT BY LEVERAGE OF BOB.

Suppose King-post 10 feet 6 inches, crank 5 feet 6 inches, beam 11 feet 6 inches, the question is simply solved by a sum by the ordinary rule of three; as 10 feet 6 inches is to 5 feet 6 inches, so is 11 feet 6 inches, equal to 6 feet stroke.

*** The preceding rules are simple in themselves, and should be universally known; the object in the next volume will be to furnish others, and we court assistance; but, unfortunately, we too often find agents sadly wedded to old prejudices, and a degree of jealousy pervading them as to the abilities of others, and that more particularly the rising generation;—this is not as it should be.

STATISTICS OF THE IRON TRADE.

In 1740 the make of Pig-iron in each county of England, as nearly as could be arrived at, was as follows:—

	Furnaces.	Tons.		Furnaces.	Tons.
Brecon	2	600	Monmouthshire	2	900
Glamorganshire	2	400	Nottinghamshire	1	200
Carmarthenshire	1	100	Salop	6	2,100
Cheshire	3	1,700	Staffordshire	2	1,000
Denbighshire	2	550	Worcestershire	2	700
Derbyshire	4	800	Sussex	10	1,400
Gloucestershire	6	2,850	Warwickshire	2	700
Herefordshire	3	1,350	Yorkshire	6	1,400
Hampshire	1	200			
Kent	4	400	Total	59	17,350

					Tons
In 1750, the production of Great Britain was					22,000
1788,	ditto	ditto	by 85 furnaces		68,000
1796,	ditto	ditto	121	,,	125,000
1806,	ditto	ditto	169	,,	250,000
1820,	ditto	ditto	—	,,	400,000
1827,	ditto	ditto	284	,,	690,000

By different districts, as follows:—

	Furnaces.	Tons.		Furnaces.	Tons.
Staffordshire	95	216,000	Derbyshire	14	20,500
Shropshire	31	78,000	All Scotland	18	36,500
South Wales	90	272,000			
North Wales	12	24,000	Total	284	690,000
Yorkshire	24	43,000			

In 1830, Great Britain produced, by 376 furnaces, 677,417 tons; and in 1840, by 402 furnaces, 1,396,400 tons, as follows:—

	Furnaces.	Tons.		Furnaces.	Tons.
South Wales	132	505,000	Forest of Dean	4	15,500
Staffordshire	123	427,650	Northumberland	5	11,000
Shropshire	24	82,750	All Scotland	64	241,000
Yorkshire	25	56,000			
Derbyshire	13	31,000	Total	402	1,396,400
North Wales	12	26,500			

By 162 hot-blast furnaces	Tons 625,000
240 cold-blast ditto	771,400
402 furnaces.	Tons 1,396,400

Scotland alone produced:—

				Tons
In 1845, by 94 furnaces,	as near as could be calculated			500,000
1846, by 97	ditto	ditto		520,000
1847, by 89	ditto	ditto		500,000
1848, by 103	ditto	ditto		590,000
1849, by 113	ditto	ditto		690,000

Or a quantity equal to the production of Great Britain in 1827, by 284 furnaces.

Annual Output per Furnace.

				Tons
1740, average production	per furnace	per annum		294
1796,	ditto	ditto	ditto	1,033
1827,	ditto	ditto	ditto	2,429
1840,	ditto	ditto	ditto	3,473
1849,	ditto	ditto	ditto	6,106

NUMBER of FURNACES and MAKE of IRON in ENGLAND, SCOTLAND, and WALES, in the Year 1806.

STAFFORDSHIRE.

Name of Works.	Furnaces.			Make per Year.	Owners.
	In.	Out.	Total.		
Apedale	1	—	1	1,400	G. Parker & Co.
Silverdale	1	—	1	1,010	R. Sneyd.
Golden Hill	1	—	1	184	Banks & Co.
Level	2	1	3	3,351	Gibbons.
Brierley	—	2	2	—	Orrions.
Brierley Hill	1	—	1	817	Orrions.
Park Head	1	—	1	1,404	Parker.
Blowers Green.. ..	1	—	1	2,436	Gravebrook.
Netherton	1	1	2	1,500	Atwoods.
Gornal Wood	1	—	1	432	Banks.
Graveyard	1	1	2	1,274	Hawkes & Co.
Dibsdale Bank... ..	1	—	1	300	Dixon.
Deepfield	2	—	2	3,660	Stokes.
Bilston	2	1	3	3,550	Birkley & Co.
Bradley	2	1	3	2,566	J. Wilkinson.
Capon Field	2	—	2	4,600	Smith, Read, & Co.
Rough Hill	2	—	2	3,000	Fereday & Co.
Mill Field	2	—	2	5,000	Fereday & Co.
Gospel Oak	2	—	2	4,667	Read.
Toll End	1	1	2	1,220	R. Hawkes.
Moorcroft	1	1	2	1,955	Addenbrook Estab.
Wednesbury	—	1	1	—	Atwood.
Dudley Port	1	—	1	1,196	Parkes.
Oldbury	1	—	1	4,500	Barker.
Tipton	2	—	2		Barker.
	32	10	42	50,002	

CUMBERLAND.

Name of Works.	In.	Out.	Total.	Make per Year.	Owners.
Bearpot or Seaton ..	1	—	1	670	Barker.
Duddon	1	—	1	325	Mitchell & Co.
Newland	1	—	1	200	Knott & Co.
Backbarrow	1	—	1	760	Mitchell & Co.
	4	—	4	1,955	

DERBYSHIRE.

Name of Works.	In.	Out.	Total.	Make per Year.	Owners.
Dale Abbey	—	2	2	—	A. Raby.
Morley Park ..	1	—	1	420	Francis Hurst.
Butterly..	2	—	2	1,766	Outran & Co.
Chesterfield	2		3	1,700	Smith & Co.
Duckmanton	1	1	2	900	Smith & Co.
Wingerworth	1	1	2	819	J. Butler.
Staveley..	1	—1	1	596	Lowe Ward. [&Co.
Alfreton..	1	—	1	1,450	Saxleby, Edwards,
Hasland	1	—	1	723	J. Brocksop.
Chesterfield	1	1	2	700	Top & Co.
	11	6	17	9,074	

FURNACES and MAKE of IRON in the year 1806—(*continued*).

SHROPSHIRE.

Name of Works.	Furnaces. In.	Furnaces. Out.	Furnaces. Total.	Make per Year.	Owners.
Cornbrook	1	—	1	292	T. W. B. Bolfield.
Clee Hill	1	—	1	303	George & Co.
Old Park	4	—	4	8,359	Bolfield.
Horse Hay	2	—	2	3,834	Dale & Co.
Colebrook Dale ..	2	—	2	2,962	Dale & Co.
Light Moor	3	—	3	5,601	Addenbrook.
Madeley Wood.. ..	2	—	2	2,951	Reynolds.
Benthal	1	—	1	1,294	Harris.
Willey	—	1	1	—	J. Wilkinson.
Broseley	1	—	1	1,450	Banks & Co.
Kitley	2	2	4	7,510	Reynolds.
Billingsley	—	2	2	—	Stoke.
Queen's Wood ..	1	—	1	2,605	Reynolds.
Snedshill	2	1	3	3,950	Bishton.
Culcott	1	4	5	2,269	Brodie & Co.
Barnets Lason	1	1	2	574	Jesson.
Donnington Wood ..	2	1	3	3,400	Bishton.
Rockwarden	2	—	2	4,000	Bishton.
New Hadley	2	—	2	3,612	J. Wilkinson.
	30	12	42	54,966	

LANCASHIRE.

Name of Works.	In.	Out.	Total.	Make per Year.	Owners.
Leighton	1	—	1	780	——
Haigh	—	2	2	—	Earl Balcarras.
	1	2	3	780	

LEICESTERSHIRE.

Name of Works.	In.	Out.	Total.	Make per Year.	Owners.
Ashby	—	1	1	—	Lord Moira.

NORTHUMBERLAND.

Name of Works.	In.	Out.	Total.	Make per Year.	Owners.
Newcastle-upon-Tyne	2	—	2	2,500	Bulmer & Co.

YORKSHIRE.

Name of Works.	In.	Out.	Total.	Make per Year.	Owners.
Sheffield Park	1	—	1	1,905	Booth & Co.
Chapel Town	1	2	3	3,737	Swallow & Co.
Thorncliffe	2	—	2	2,500	Chambers & Co.
Bowling..	2	1	3	2,473	Sturges & Co.
Low Moor	4	—	4	5,143	Jarratt & Co.
Shelf	2	1	3	2,716	Haydon & Co.
Birkenshaw	1	—	1	612	Emmett & Co.
Rennishaw	1	—	1	975	Appleby & Co.
Elsecar	2	—	2	2,495	Darwen & Co.
Bretton	1	—	1	250	Cook & Co.
Holmes and Milton ..	3	—	3	3,000	Walkers.
Calden	1	—	1	1,040	Emmett.
Fieldhead	1	—	1	800	Parker.
	22	4	26	27,646	

MONMOUTHSHIRE.

Name of Works.	In.	Out.	Total.	Make per Year.	Owners.
Abbey Tintern	1	—	1	987	Thompson.
Bishop's Wood.. ..	1	—	1	653	Partridge & Co.
Pontypool	1	—	1	600	Leigh.
	3	—	3	2,240	

FURNACES and MAKE of IRON in the year 1806—(*continued*).

SOUTH WALES.

Name of Works.	Furnaces. In.	Out.	Total.	Make per Year.	Owners.
Clydack	1	1	2	2,802	Frere, Cook, & Co.
Blandare	—	1	1	—	Barnaly.
Blaenavon	3	1	4	7,846	Hill & Hopkins.
Sirhowy	2	—	2	3,700	Fothergill & Co.
Ebbwvale	1	1	2	3,664	Harford & Co.
Beaufort	2	—	2	4,696	Kendale & Co.
Tredegar	2	—	2	4,500	S. Homphray & Co.
Hirwain	1	—	1	500	Bowger & Co.
Nanteglo	—	2	2	—	Hill & Co.
Aberdare	2	—	2	3,586	Scales & Co.
Abernant	1	1	2	4,376	Tapperton.
Melincourt	1	—	1	1,000	Myers.
Varteg	1	—	1	1,000	Knight & Co.
Ennisyddin	1	—	1	1,000	Parsons.
Neath Abbey	—	2	2	—	Foxes & Co.
Carphilly	1	—	1	1,000	Harford & Co.
Penruton	—	1	1	—	Raby.
Cyfarthfa	4	—	4	9,000	R. Crawshay.
Plymouth	3	—	3	5,000	R. Hill & Son.
Pennydarrow	3	—	3	6,780	S. Homphray & Co.
Dowlais	3	—	3	6,000	Tail.
Llanelly	2	—	2	2,267	A. Raby.
Dowey	1	0	1	150	Kendalls.
	35	10	45	68,867	
NORTH WALES.					
Ruabon	1	—	1	1,463	Rowland & Co.
Brymbo	1	1	2	462	J. Wilkinson.
Carmarthen	1	—	1	1,056	——
	3	1	4	2,981	
SCOTLAND.					
LINLITHGOWSHIRE.					
Carrow	5	—	5	7,380	Carrow & Co.
LANARKSHIRE.					
Wilson Town	1	1	2	1,381	Wilson.
Muirkirk	2	1	3	3,043	Robertson & Co.
Clyde	2	1	3	2,687	Caddel & Co.
Omoa	2	1	3	1,852	Dalrymple.
Calder	1	1	2	1,077	Dixon & Co.
Glenbuck	1	—	1	790	Dixon & Co.
Shotts	1	—	1	2,034	Logan & Co.
	10	5	15	12,864	
CLACKMANNAN.					
Devon	2	—	2	2,596	Gordon & Co.
ARGYLESHIRE.					
Argyle	—	2	2	—	——
Borrow	1	—	1	—	——
	1	2	3		
FIFESHIRE.					
Marknech ..	—	2	2	—	Losh & Co.

FURNACES and MAKE of IRON in the year 1806—(*continued*).

TOTAL.

Name of Works.	Furnaces.			Tons per year.
	In.	Out.	Total.	
Staffordshire	32	10	42	50,002
Cumberland	4	—	4	1,955
Derbyshire	11	6	17	9,074
Shropshire	30	12	42	54,966
Lancashire	1	2	3	780
Leicestershire	—	1	1	—
Northumberland	2	—	2	2,500
Yorkshire	22	4	26	27,646
Monmouthshire..	3	—	3	2,240
North Wales	3	1	4	2,981
South Wales	35	10	45	68,867
Scotland	18	9	27	22,840
Total	161	55	216	243,851

NUMBER of FURNACES and MAKE of IRON in GREAT BRITAIN in the Year 1848.

STAFFORDSHIRE.

Name of Works.	Furnaces.			Make per Year.	Owners.
	In.	Out.	Total.		
Lane End	2	1	3	8,320	Sparrow.
Etruria	2	1	3	7,280	Lord Granville.
Kidd's Grove	3	—	3	13,520	Kinnersley.
Tunstall..	2	—	2	6,240	Williamsons.
Apedale..	4	—	4	18,720	Heathcote.
Madely	1	1	2	4,160	Firmstone.
Silverdale	2	—	2	7,280	R. Sneyd.
	16	3	19	65,520	
Darlaston	1	1	2	— *	Addenbrook & Co.
Bilston	1	1	2	—	Baldwin & Co.
Gold's Green	2	1	3	—	Bagnall & Sons.
Darlaston Green ..	1	—	1	—	Bills & Mills.
Ellingshall	1	1	2	—	Banks & Son.
DudleyW. & Northerton	2	4	6	—	British Iron Co.
Corngreaves	2	—	2	—	British Iron Co.
Withygrove	1	1	2	—	Best & Bars.
Russell Hall	3	—	3	—	Blackwell & Co.
Woodside	1	1	2	—	Cochrane & Co.
Tipton	1	1	2	—	Creswell & Sons.
Horsley Hole	2	—	2	—	Chillington & Co.
Wolverhampton ..	2	1	3	—	Dixon, Nevi, & Co.
Crookhay	3	—	3	—	Daws & Sons.
Oldbury	—	2	2	—	Daws & Sons.
Parkhead	1	1	2	—	Evers & Martin.

* Average make of each furnace, 4,160 tons per year.

FURNACES and MAKE of IRON in the year 1848—*(continued)*.

STAFFORDSHIRE—*(continued)*.

Name of Works.	Furnaces. In.	Furnaces. Out.	Furnaces. Total.	Make per Year.	Owners.
Pelsull	1	1	2	— *	R. Fryer.
Lays	2	1	3	—	W. & G. Firmstone
Shutend	3	1	4	—	J. Foster.
Netherton	1	1	2	—	M.&W.Grazebrook
Corbyn's Hall	2	2	4	—	Malins & Co.
Horseley	2	—	2	—	J. Hartland.
Dudley Port	1	—	1	—	J. Hopkins.
Buffery	—	1	1	—	J. Haden.
Level	1	1	2	—	W. Igons & Co.
Chillington	3	1	4	—	Barker & Foster.
Coseley	2	—	2	—	G. Jones.
New Duffield	2	1	3	—	G. Jones.
New Birchills	—	2	2	—	G. Jones.
Ketley	—	3	3	—	Jones & Oaks.
Bentley	—	4	4	—	Earl of Lichfield.
Wednesbury	1	1	2	—	Loyds, Foster, &Co.
Park Lane	1	—	1	—	T. Morris.
Oak Farm . ..	2	2	4	—	Oak Farm Co.
Parkfields	3	1	4	—	Parkfield Co.
Bilston Brook	—	2	2	—	J. Parson.
Coseley	2	1	3	—	Pemberton & Co.
Millfield	2	1	3	—	W. Riley.
Slowheath	—	5	5	—	W. & J. Sparrow.
Osier Bed	2	1	3	—	W. & J. Sparrow.
Willingsworth	1	2	3	—	Sir H. St. Paul.
Waterloo	1	1	2	—	Sir H. St. Paul.
Windmill	—	2	2	—	Sir H. St. Paul.
Cappon Field	2	1	3	—	J. Bagnall & Sons.
Birchills	1	—	1	—	E. Tyler.
Priestfields	2	1	3	—	W. W. Priestfield.
Bradley	1	—	1	—	Trusts.ofJ.Wilkin.
Wednesbury Oak ..	3	—	3	—	Williams & Sons.
Union	2	1	3	—	Williams & Sons.
Coneyqu	1	2	3	—	Lord Ward.
Level	1	2	3	—	Lord Ward.
Bilston	1	—	1	—	Woolley & Co.
Prior's Field	2	1	3	—	H. B. Whitehouse.
Brettle Lane	1	1	2	—	J. & W. Wheely.
Corbyn's Hall	2	—	2	—	B. Gibbons.
Meadow Furnace ..	1	—	1	—	Hall, Holcroft, &Co.
	77	62	139		

YORKSHIRE.

Name of Works.	In.	Out.	Total.	Make per Year.	Owners.
Low Moor	5	1	6	14,560	Hird, Dauson, &Co.
Bierly	3	1	4	8,320	Clayton & Co.
Bowling	4	1	5	10,400	Sturgess & Co.
Waterloo	1	—	1	2,340	Fenton.
Farnley	1	1	2	2,600	Armitage.
Worsbro'	1	—	1	2,600	Field, Cooper, &Co.
Thorncliffe	2	—	2	6,750	Chambers & Co.
Chapel Town	2	—	2	5,200	Schofield & Co.
Park Gate	1	—	1	5,200	Schofield & Co.
Elsecar	1	1	2	2,340	Lord Fitzwilliam.
Milton	2	—	2	6,240	Graham.
	23	5	28	66,560	

* Average make of each furnace, 4,160 tons per year.

Furnaces and Make of Iron in the year 1848—(*continued*).

Derbyshire.

Name of Works.	Furnaces. In.	Out.	Total.	Make per Year.	Owners.
Butterley Hall	3	—	3	9,880	Butterley Co.
Codnor Park	3	—	3	10,920	Butterley Co.
Alfreton	3	—	3	6,240	Oakes & Co.
Morley Park	2	—	2	4,680	Mold & Co.
Wengerworth	2	1	3	10,400	Yates & Co.
Clay Cross	—	2	2	8,320	Stephenson & Co.
Starcley	3	1	4	8,840	Barrow.
Renishaw	1	1	2	4,680	Appleby & Co.
Newbold	—	1	1	4,160	Schofield & Co.
Adelphi	—	2	2	8,320	Elsom & Co.
Stanton	3	—	3	10,400	Smith & Co.
West Hallam	—	2	2	8,320	Whitehouse.
	20	10	30	95,160	

Shropshire.

Name of Works.	In.	Out.	Total.	Make per Year.	Owners.
Madeley Wood Co. ..	2	1	3	7,280	—
Colebrook Dale Co. ..	8	—	8	24,960	—
Old Park Iron-works ..	6	2	8	18,720	W. & B. Bolfield.
Langley Co.	1	1	2	3,120	—
Lilleshall Co.	6	1	7	18,720	—
—	3	—	3	9,360	J. Foster.
Ketley Co.	2	1	3	6,240	—
	28	6	34	88,400	

Northumberland, &c.

Name of Works.	In.	Out.	Total.	Make per Year.	Owners.
Consett and Crook Hall	7	7	14	29,120	Derwent Iron Co.
Birtley Works	2	1	3	8,320	Birtley Iron Co.
Walker Works.. ..	2	—	2	8,320	Losh, Wilson, &Co.
Wylam Works.. ..	1	—	1	4,160	Bell, Brothers.
Tyne Works	2	—	2	8,320	Tyne Iron Co.
Hareshaw Works ..	2	1	3	8,320	—
Redesdale Works ..	2	1	3	8,320	Redesdale Iron Co.
Tow Law Works ..	2	1	3	8,320	Weardale Iron Co.
Stanhope	1	—	1	4,160	Weardale Iron Co.
Witton Park Co. ..	3	1	4	12,480	—
	24	12	36	99,840	

Scotland.

Name of Works.	In.	Out.	Total.	Make per Year.	Owners.
Gartsherrie	16	—	16	—*	Wm. Baird & Co.
Dundyvan	8	1	9	—	John Wilson.
Clyde	5	2	7	—	C. Dunlop & Co.
Govan	4	2	6	—	Wm. Dixon.
Calder	3	5	8	—	Wm. Dixon.
Langloan	5	1	6	—	Addie, Miller, & Co.
Carnbroe	3	3	6	—	Merry & Co.
Glengarnock	6	1	7	—	Merry & Co.
Summerlee	5	1	6	—	Wilsons & Co.
Monkland	9	—	9	—	Monkland Iron Co.
Coltness	4	2	6	—	Coltness Iron Co.
Omoa	4	—	4	—	R. Stewart.

* Average make of each furnace, 6,000 tons per year.

FURNACES and MAKE of IRON in the year 1848—(*continued*).

SCOTLAND—(*continued*).

Name of Works.	Furnaces.			Make per Year.	Owners.
	In.	Out.	Total.		
Shotts	3	1	4	— *	Shotts Iron Co.
Castlehill	2	1	3	—	Shotts Iron Co.
Blair	—	5	5	—	Ayrshire Iron Co.
Muirkirk	—	4	4	—	Muirkirk Iron Co.
Garscube	—	2	2	—	John Watson.
Carron	3	1	4	—	Carron Iron Co.
Devon	1	—	1	—	Devon Iron Co.
Forth	4	2	6	—	Forth Iron Co.
Kinneil	4	—	4	—	John Wilson.
Lugar	—	4	4	—	Lugar Iron Co.
Eglinton..	—	3	3	—	Wm. Baird & Co.
	89	41	130	—	
NORTH WALES.					
Coad Talon	1	—	—	1,560	—
Brymbo	2	—	—	6,240	—
British Company ..	1	—	—	5,200	—
Platisa	1	—	—	3,120	—
	5	—	—	16,120	
SOUTH WALES.					
Cwm Brain	1	—	1	— †	R. J. Blewitt.
Pontypool & Blacadare	1	3	4	—	C. H. Leigh.
Pentwyn Golynos & Var	5	3	8	—	Williams & Co.
Aberyschan	4	2	6	—	British Iron Co.
Blainafon	4	1	5	—	Blainafon Iron Co.
Clydach	4	—	4	—	Powell & Co.
Naty Glog and Beaufort	12	2	14	—	J. & J. Bailey.
Coalbrook Vale.. ..	1	1	2	—	Brewer & Co.
Blaina and Cwn Celyn..	4	2	6	—	Crutluwell & Co.
Ebbw Vale & Sir Howy	8	1	9	—	Dailey & Co.
Victoria	2	2	4	—	Joint Stock.
Tredegar	7	—	7	—	Tredegar Iron Co.
Rhymney	9	1	10	—	Rhymney Iron Co.
Dowlais	18	—	18	—	Guest & Co.
Penydarran	6	1	7	—	Thompson & Co.
Cyfartha Ynistack and Herwain	13	2	15	—	W. Crawshay.
Plymouth and Duffrin..	7	1	8	—	A. Hill.
Gadlys	1	1	2	—	Wayne & Co.
Aberdare and Abernant	6	—	6	—	Thompson & Co.
Pentyrch	1	1	2	—	T. W. Booker.
Penalt	2	—	2	—	Iwons & Co.
Neath Abbey	2	—	2	—	J. Price.
Cwm Avon	6	1	7	—	Copper Mining Co.
Onllwyn	2	—	2	—	John Williams.
Llynvi	1	2	3	—	Joint Stock.
Toudee	1	1	2	—	Sir R. Price.
Amwain	2	—	2	—	Llewellyn & Co.
Cefr Cwse and Garth ..	2	3	5	—	Maling & Co.
Llandare	1	—	1	—	Sir John Norris.

* Average make of each furnace, 6,000 tons per year.
† Average make of each furnace, 4,680 tons per year.

FURNACES and MAKE of IRON in the year 1848—(*continued*).

SOUTH WALES—(*continued*).

Name of Works.	Furnaces. In.	Furnaces. Out.	Furnaces. Total.	Make per Year.	Owners.
Banwen	—	2	2	—*	Joint Stock.
Ystalyfera	6	5	11	—	Ystalifera Iron Co.
Yniscedwyn	5	2	7	—	Crane & Co.
Maesteg	2	1	3	—	Maesteg Iron Co.
Millbrook	1	—	1	—	Millbrook Iron Co.
Cambrian	2	1	3	—	Cambrian Iron Co.
Gwenebriaeth	2	1	3	—	Walneg & Co.
Trulsarran	—	2	2	—	Nartch & Co.
	151	45	196	—	

* Average make of each furnace, 4,680 tons per year.

TOTAL.

Name of Works.	Furnaces. In.	Furnaces. Out.	Furnaces. Total.	Make per Year.
North Staffordshire	16	3	19	65,520
South Staffordshire	77	62	139	320,320
Yorkshire	23	5	28	66,560
Derbyshire	20	10	30	95,160
Shropshire	28	6	34	88,400
Northumberland	24	12	36	99,840
Scotland..	89	41	130	539,962
North Wales	5	6	11	16,120
South Wales	151	45	196	706,680
Total	433	190	623	1,993,568

COMPARATIVE STATEMENT of the NUMBER of FURNACES and MAKE of IRON in the Years 1806 and 1848.

Name of Works.	Furnaces. In. 1806.	In. 1848.	Out. 1806.	Out. 1848.	Total. 1806.	Total. 1848.	Make per Year. 1806.	Make per Year. 1848.
Staffordshire ..	32	93	10	65	42	158	50,002	385,840
Yorkshire ..	22	23	4	5	26	28	27,646	66,560
Derbyshire ..	11	20	6	10	17	30	9,074	95,160
Shropshire ..	30	28	12	6	42	34	54,966	88,400
Northumberland	2	24	—	12	2	36	2,500	99,840
Cumberland ..	4	—	—	—	4	—	1,955	—
Lancashire ..	1	—	2	—	3	—	780	—
Leicestershire ..	—	—	1	—	1	—	—	—
Monmouthshire	3	—	—	—	3	—	2,240	—
Scotland.. ..	18	89	9	41	27	130	22,840	539,968
North Wales ..	3	5	1	6	4	11	2,981	16,120
South Wales ..	35	151	10	45	45	196	68,867	706,680
Total ..	161	433	55	190	216	623	243,851	1,998.558

The following Return of Furnaces in the respective years of 1806 and 1848, shows an increase of 407 furnaces, with a make of 1,754,717 tons:—

Year.		In.		Out.		Total.		Make.
January, 1806	..	161	..	55	..	216	..	243,851
January, 1848	..	433	..	190	..	623	..	1,998,568
Increase ..	..	272	..	135	..	407	..	1,754,717

SCOTLAND TRADE.

Years.	In Blast.	Out of Blast.	Total Furnaces.
1788	8	—	8
1796	17	—	17
1823	22	—	22
1830	27	—	27
1846	97	25	122
1847	89	43	132
1848	103	36	139
1849	113	31	144

The two furnaces first erected were the Goatfield and Bunawe (charcoal); of the working of which, however, we have no record after 1796; the next, the Wilsontown, was discontinued in 1830. The most important is the Gartsherrie Company, which commenced in 1846, with 14 furnaces in blast and 2 building = 16, which have continued until the present period.

PIG-IRON WORKS AND FURNACES, 1849.

Name of Works.	Proprietors.	Furnaces.	In.	Out.	Building.
Gartsherrie ..	Wm. Baird and Co.	16	6	—	—
Dundyvan ..	John Wilson	9	8	1	—
Clyde	C. Dunlop & Co.	7	6	1	—
Calder	Wm. Dixon	8	5	3	—
Govan	Ditto	6	4	2	—
Monkland ..	Monkland Iron & Steel Co. ..	9	9	—	—
Carnbro'.. ..	Merry & Cunningham ..	6	3	3	—
Summerlee ..	Wilson & Co.	6	6	—	—
Coltness.. ..	Coltness Iron Company ..	6	6	—	—
Langloan	Addie, Miller, & Rankin ..	6	6	—	—
Carron	Carron Company	5	2	3	—
Muirkirk ..	Dunlop, Wilson, & Co. ..	3	1	2	—
Shotts	Shotts Iron Company.. ..	4	4	—	—
Glengarnock ..	Merry & Cunningham ..	9	9	—	—
Omoa	Robert Stewart..	4	1	—	—
Devon	Wilson & Christie	5	4	1	—
Blair	Ayrshire Iron Company ..	5	—	5	—
Garscube ..	John Watson..	2	—	2	—
Castlehill ..	Shotts Iron Company.. ..	3	2	1	—
Forth	Forth Iron Company.. ..	6	4	1	1
Kirmell	John Wilson	4	4	—	—
Lugar	Ditto	4	4	—	—
Eglinton.. ..	Wm. Baird & Co.	4	3	1	—
Dalmellington ..	Dalmellington Iron Company	3	3	—	—
Portland.. ..	Portland Iron Company ..	2	2	—	—
Nithsdale ..	Nithsdale Iron Company ..	3	—	—	3
Lochgelly ..	Lochgelly Iron Company ..	2	1	1	—
Totals ..	.. ..	144	113	27	4

Each furnace producing, on an average, 6,000 tons per annum; the greater number, however, *actually* putting out *upwards* of 7,000 tons.

FURNACES IN SOUTH WALES, 1849.

Name of Works.	Proprietors.	In.	Out.	Total.	Name of Valley where the work is situated.
Cwm Brain	R. J. Blewitt.. ..	1	0	1	Pontypool Valley.
Pentwyn, Golynos, & Varteg	Williams & Co. ..	7	1	8	Ditto.
Aberyschan	N. British Iron Co...	3	3	6	Ditto.
Blaenavon	Blaenavon Iron Co...	4	1	5	Ditto.
Pontypool	C. H. Leigh, Esq. ..	2	1	3	Ditto.
Clydach	Powell & Co. ..	4	0	4	Ditto.
Nantyglo and Beaufort ..	Messrs. Bailey ..	14	0	14	Blaina.
Coalbrook Vale	Messrs. Brewer & Co.	5	0	5	Ditto.
Blaina and Cwm Celyn ..	Messrs. Crutwell ..	3	3	6	Ditto.
Ebbw Vale	Messrs. Darby & Co.	4	0	4	Ebbw.
Sirhowy	Ditto	4	1	5	Sirhowy.
Victoria	Ditto	2	2	4	Ebbw.
Tredegar	Tredegar Iron Co. ..	7	0	7	Sirhowy.
Rhymney	Rhymney Iron Co. ..	9	1	10	Rhymney.
Dowlais and Ifor	Sir J. J. Guest & Co.	16	2	18	Taff.
Pen-y-darren	Thompson & Co. ..	5	2	7	Ditto.
Plymouth, or Furnace Ishaf, and Duffryn ..	A. Hill & Co. ..	8	0	8	Ditto.
Ynys Fach	W. Crawshay, Esq...	4	0	4	Ditto.
Cyfarthfa	Crawshay & Co. ..	16	1	11	Ditto.
Pentyrch	T. Booker, Esq. ..	1	1	2	Ditto.
Hirwain	Crawshay & Co. ..	4	0	4	Aberdare.
Aberdare and Abernant ..	Fothergill & Co. ..	5	1	6	Ditto.
Gadly's	Wayne & Co. ..	1	1	2	Ditto.
Aberaman	C. Bailey, Esq. ..	2	0	2	Ditto.
Tonddu	Sir R. Price	1	1	2	Llynfi.
Cefn Cwse	H. Scale, Esq. ..	1	2	3	Ditto.
Garth	Messrs. Scale ..	0	3	3	Ditto.
Maesteg	Maesteg Iron Co. ..	0	3	3	Ditto.
Llwyni	Cambrian Iron Co. ..	2	2	4	Ditto.
Cefn Crib	——	0	1	1	Ditto.
Oakwood and Amwain ..	W. Llewellyn, Esq.	5	0	5	Ditto.
Cwmafon	Cop. Miners of Eng..	4	0	4	Avon Valley.
Penallt	Jevons & Co... ..	0	2	2	Neath.
Neath Abbey..	Neath Abbey Iron Co.	0	2	2	Ditto.
Onllwyn	J. Williams, Esq. ..	2	0	2	Swansea.
Millbrook, or Landore ..	Sir J. Morris ..	0	2	2	Ditto.
Ystalyfera	Ystalyfera Iron Co. ..	4	7	11	Ditto.
Ynyscedwyn	Ynyscedwyn Iron Co.	5	2	7	Ditto.
Banwen	Banwen Company ..	0	2	2	Ditto.
Truisarran	Martole & Co. ..	0	2	2	Amman.
Gwaindraith	Walvey & Co. ..	1	2	3	Ditto.
Amman	——	2	0	2	Ditto.
Total ..	.. .. ..	149	54	203	

FURNACES IN SOUTH STAFFORDSHIRE AND WORCESTERSHIRE,—1849.

Names of Works.	Proprietors.	In.	Out.	Total.
Oldbury	John Dawes & Sons	2	0	2
Union	P. Williams & Sons	2	1	3
Ridgacre	— Fowler	0	0	0
Crookhay	Thomas Davies	2	1	3
Goldshil	Bagnall & Sons	3	0	3
Toll End	Eagle Furnace Co.	0	0	0

FURNACES IN STAFFORDSHIRE AND WORCESTERSHIRE—(*continued*).

Names of Works.	Proprietors.	In.	Out.	Total.
Toll End	Birmingham Coal Co.	0	0	0
Old Park	Lloyds, Foster, & Co.	1	1	2
Wednesbury Oak..	P. Williams & Sons	3	0	3
Wellingsworth	Haines & Co.	2	1	3
Broadwaters	Colburn, Growcott, & Co. ..	2	0	2
Bentley Heath	E. of Lichfield	0	4	4
Old Birch Hills	P. Williams & Sons	1	0	1
Coltham	John Mainwaring	0	0	0
Pelsall	Wm. Fryer	1	1	2
Darlaston	Mills & Co.	1	0	1
New Darlaston	Addenbrook & Co.	2	0	2
Dudley Port	Thomas Morris	1	0	1
Ditto	— Hopkins	2	0	2
Coneygree	L. Ward	0	3	3
Horsley	Horseley & Co.	2	0	2
Tipton	E. Cresswell & Sons	0	2	2
Prior Fields	H. B. Whitehouse	2	1	3
Deep Fields	Benton & Pemberton	2	1	3
Capon Field	John Bagnall & Sons	2	1	3
Eltingshall	Thomas Banks & Son	1	1	2
Stone Fields (near Bilston) ..	E. Woolley (now T. W. Vernon)	1	0	1
Hall Fields	B. Gibbons	1	0	1
Bilston Brook	John Parsons	0	2	2
Bonvereux..	Baldwin & Co.	1	1	2
Bilston	George Jones	2	1	3
Coseley	Turley, Brothers	1	1	2
Millfields	W. Riley	3	0	3
Park Fields	Parkfield Co.	3	1	4
Priest Fields	W. Ward	2	1	3
Stow Heath	W. Sparrow	3	2	5
Osier Bed	——	2	1	3
Chillington	Chillington Co.	4	0	4
Netherton	M. & W. Grazebrook	1	1	2
Dudley Wood	B. I. Co.	1	3	4
Bumble Hole, Netherton Works	Ditto	1	1	2
Corngreaves	Ditto	1	1	2
Buffery	Jones & Oakes	0	0	0
Ketley's	Ditto	0	3	3
Russell's Hall	Blackwell..	2	1	3
Dixon's Green	Joseph Hadden	1	0	1
Windmill End	W. Hadden	1	1	2
Withymoor	Best & Bans	0	2	2
Parkhead	Evers & Martin	1	1	2
Corbyn's Hall, New Furnaces ..	Benjamin Gibbons	4	0	4
Ditto Old ditto.. ..	Gal. Iron Co.	0	4	4
Level Iron-Works	L. Ward	0	3	3
Old Level	John Lyon	1	1	2
Brettell Lane	John Wheeley & Co.	0	2	2
Jay's Works	W. & G. Firmstone	3	0	4
Shut End	John Bradley & Co.	4	0	4
Oak Farm	Oak Farm Co.	0	2	2
Woodside	Bramah & Cochrane	1	1	2
Wolverhampton	Dixon	2	1	3
Moseley	Chillington Iron Co.	2	1	2
New Birch Hills	George Jones	2	0	2
Old Hill..	T. & J. Badger	1	0	1
Tipton Green Old Furnaces ..	B. Gibbons, jun...	1	1	2
Darlaston Green	David Jones	1	0	1
Bloxwich	W. Fryer	1	0	1
Total	.. ..	89	58	147

FURNACES—NEWCASTLE.

Name of Works.	Proprietors.	In.	Out.	Total.
Ridsdale	Ridsdale Iron Co.	1	2	3
Hareshaw	Hareshaw Iron Co.	—	—	3
Wylam..	Bell Brothers	1	—	1
Walker	Losh, Wilson, & Bell	2	—	2
Birtley	Birtley Iron Co.	2	1	3
Tyne	Tyne Iron Co.	1	1	2
Derwent and Shotley Bridge ..	Mounsey & Co.	5	9	14
Witton Park	Bolckow & Vaughan	3	1	4
Weardale & Towlaw	Weardale Iron Co.	2	1	3

[We hope that some of our correspondents will favour us with returns from other places.]

PRODUCTION OF MALLEABLE IRON.

1845—Estimated at		.. ..	Tons 35,000
1846	ditto	.. .. ..	45,000
1847	ditto	.. .. ..	60,000
1848	ditto	.. .. ..	90,000
1849	ditto	.. .. ..	80,000

AVERAGE PRICE OF BAR IRON.

Year	£. s. d.	Year	£. s. d.	Year	£. s. d
1813	13 6 8	1822	8 1 3	1831	5 13 9
1814	13 18 4	1823	8 0 0	1832	5 13 4
1815	13 13 4	1824	8 19 2	1833	6 12 11
1816	12 2 6	1825	12 14 2	1834	6 18 9
1817	10 12 6	1826	9 15 10	1835	6 10 0
1818	12 1 8	1827	9 7 6	1836	10 12 6
1819	12 5 0	1828	7 18 4	1837	9 1 3
1820	10 13 4	1829	6 16 8	1838	9 4 7
1821	8 18 4	1830	6 3 9	1839	9 15 0

AVERAGE MONTHLY PRICES OF BAR-IRON

FOR THE LAST TEN YEARS.

	1840.	1841.	1842.	1843.	1844.	1845.	1846.	1847.	1848.	1849.
	£.	£.	£.	£.	£.	£.	£.	£.	£.	£.
January	9	8	6½	5½	5	7¼	10	9¾	7¾	5¾
February ..	8½	8	6½	5¼	5	8½	10	10	7¾	6
March......	8½	8	6½	5¼	5½	9¾	10	10½	7¼	6½
April	8½	7½	6½	5¼	6	10	10	10	7¼	6½
May........	8½	7½	5½	5¼	6½	10	9½	10	7	6¼
June	8½	7½	5½	5	6½	9	9½	10	7	6⅛
July........	8	7	5¼	5	6½	8½	9½	9½	6⅛	5⅞
August	7½	7	5½	4¾	6½	8½	9½	9½	5¾	5¾
September..	8	7	6	5	6½	9	9½	9½	5¾	5⅝
October	8½	6½	6	5	6½	10	9½	9½	5¾	5½
November ..	8½	6½	6	5	6½	10	9½	9½	5¾	5⅜
December ..	8½	6½	6	5	6½	10	8½	9½	5¾	5½
Average..	8¾	7¼	5⅞	5⅛	6⅛	9¼	9⅔	9⅔	6⅝	5⅞

Average—First 5 years, £6. 11s. 4d.; last 5 years, £8. 3s. 10d.; last 10 years, £7. 7s. 6d.

Rails ..	..	.. 5s. to 7s. 6d. extra to prices of bars.
Sheets ..	..	.. 40s. ditto.
Angle Iron	..	.. 30s. ditto.
Hoops..	..	.. 40s. ditto.
Best Iron ..		.. 25s. to 30s. per ton extra.

AVERAGE AND COMPARATIVE VIEW OF PRICES OF PIG-IRON,

FOR THE LAST TWENTY YEARS.

1830 ..	£5 0 0	1835 ..	£4 10	1840 ..	£3 15 0
1831 ..	4 10 0	1836 ..	6 15	1841 ..	3 0 0
1832 ..	4 10 0	1837 ..	4 0	1842 ..	2 10 0
1833 ..	4 0 0	1838 ..	4 0	1843 ..	2 16 0
1834 ..	4 5 0	1839 ..	4 10		

	1844.	1845.	1846.	1847.	1848.	1849.
January	£2 0 0	£3 5 0	£4 0 0	£3 13 4	£2 7 8	2 7 0
February ..	2 5 0	3 14 0	3 17 6	3 13 4	2 9 8	2 11 7
March	2 10 0	5 5 0	3 10 6	3 11 1	2 4 6	2 9 9
April	3 5 0	5 7 6	3 6 0	3 10 8	2 1 8	2 8 0
May	3 5 0	4 8 0	3 10 0	3 5 3	2 4 2	2 3 9
June	3 5 0	3 5 0	3 8 0	3 5 0	2 3 0	2 4 4
July	3 0 0	3 5 0	3 10 0	3 8 1	2 5 3	2 5 0
August	2 15 0	3 7 6	3 15 0	3 7 9	2 4 6	2 5 4
September ..	2 10 0	4 2 0	3 13 6	3 6 0	2 4 10	2 4 0
October	2 12 6	4 10 0	3 9 6	2 19 10	2 2 9	2 2 10
November ..	2 12 6	3 17 0	3 9 0	2 11 0	2 1 9	2 4 3
December ..	2 17 6	3 16 0	3 12 6	2 7 6	2 2 0	2 7 2
Average ..	£2 14 9	£4 0 3	£3 11 9	£3 5 0	£2 4 4	£2 6 1

Average price for the five years, 1840 to 1844	.. ..	59s. 2d.
Ditto ,, ditto 1845 to 1849	.. ..	61s. 5d.
Ditto ,, ten years, 1840 to 1849	.. ..	60s. 3d.

EXPORT OF IRON FOR 1849.

	Tons.
United States	94,212
British America	7,235
South America	4,216
Australia	965
China—	
Hong-Kong	70
Shanghai	145
Germany, Holland, and Belgium	21,087
Italy	5,877
Austria	865
Jersey and Guernsey	280
Denmark, Sweden, and Norway..	4,549
France	8,453
Spain	2,534
Portugal	822
West Indies..	188
East Indies	1,035

	Tons.
Turkey—	
Constantinople	525
Egypt—	
Alexandria	125
Grand Total—	
Foreign	153,183
Coastwise	221,943
Total tons	375,126
Shipped Foreign in 1849—	
From Scotland	88,423
,, Ireland	8,156
,, England	56,604
Total tons	153,183

COMPARATIVE VIEW OF EXPORTS, STOCKS, PRODUCTION, AND PRICES,

FROM 1846, 1847, 1848, AND 1849.

		EXPORTS.			
		1849.	1848.	1847.	1846.
France	Tons	8,453	5,859	24,836	35,567
Jersey and Guernsey	..	280	329	95	268
Germany, Holland, &c. ..	..	21,087	41,417	50,857	48,766
Denmark, Sweden, and Norway	..	4,549	7,054	3,416	2,580
Russia	..	—	1,220	962	—
Turkey and Egypt	..	650	911	531	260
Austria	..	865	4,642	6,226	5,481
Italy	..	5,877			
Spain	..	2,534	1,444	1,703	2,703
Portugal	..	822	535	283	435
South America	..	4,216	1,980	1,343	538
West Indies	..	188	161	215	170
Australia	..	965	641	1,458	607
British America..	..	7,235	4,198	6,327	7,307
United States	..	94,212	90,235	44,993	13,918
China	..	215	575	175	—
East Indies	..	1,035	950	—	—
Totals	Tons	153,183	162,151	143,420	119,100
Coastwise	..	221,943	227,833	227,005	257,851

STOCKS AND PRODUCTION.	Stock.	Production.
31st December, 1846	145,000	580,000
,, 1847	90,000	540,000
Decrease in 1847	55,000	40,000
31st December, 1848	100,000	600,000
,, 1847	90,000	540,000
Increase in 1848	10,000	60,000
31st December, 1849	195,000	692,000
,, 1848	100,000	600,000
Increase in 1849	95,000	92,000

	PRICES.			
	1846.	1847.	1848.	1849.
January	£4 0 0	£3 13 4	£2 8 4	£2 7 0
February	3 17 6	3 13 4	2 10 0	2 11 7
March	3 10 0	3 11 1	2 4 4	2 9 9
April	3 6 0	3 10 8	2 1 9	2 8 0

COMPARATIVE VIEW OF EXPORTS, &c.—(*continued*).

	PRICES.			
	1846.	1847.	1848.	1849.
May	3 10 0	3 5 3	2 2 3	2 3 9
June	3 8 0	3 5 0	2 3 0	2 4 4
July	3 13 0	3 8 1	2 5 6	2 5 0
August	3 15 0	3 7 9	2 5 3	2 5 4
September	3 13 6	3 6 0	2 5 3	2 4 0
October	3 9 6	2 19 10	2 3 0	2 2 10
November	3 9 0	2 11 0	2 2 0	2 4 3
December	3 12 6	2 7 6	2 2 4	2 7 6

Averages—1845: £3. 16s.—£3. 11s. 8d.—£3. 5s.—£2. 4s. 5d.—£2. 6s. 1d.

TABLE SHOWING THE QUANTITY OF SILVER AND NUMBER OF OUNCES IN THE TON BY ASSAY OF 400 GRAINS.

Quantity of Silver in sample.	Ounces to the Ton.	Per Centage.	Parts of the whole.
	oz. dwt. gr.		
20 grains	1,633 6 12	5¼	1·20
19 ,,	1,551 13 8	4¾	21·65
18 ,,	1,470 0 0	4½	22·22
17 ,,	1,388 6 16	6¼	23·53
16 ,,	1,306 13 8	4	25
15 ,,	1,225 0 0	3¾	26·26
14 ,,	1,143 6 16	3½	28·57
13 ,,	1,061 13 8	3¼	30·76
12 ,,	980 0 0	3	33·33
11 ,,	898 6 16	2¾	36·36
10 ,,	816 13 8	2½	40
9 ,,	735 0 0	2¼	44·44
8 ,,	653 6 16	2	50
7 ,,	571 13 8	1¾	57·14
6 ,,	490 0 0	1½	66·66
5 ,,	408 6 16	1¼	80
4 ,,	326 13 8	1	100
3 ,,	245 0 0	¾	0
2 ,,	163 6 16	½	200
1 ,,	81 13 8	¼	400
$\frac{7}{8}$,,	71 9 4	$\frac{1}{32}$	428·57
$\frac{3}{4}$,,	61 5 0	$\frac{3}{16}$	533 33
$\frac{5}{8}$,,	51 0 20	$\frac{5}{32}$	640
$\frac{1}{2}$,,	40 16 16	$\frac{1}{8}$	800
$\frac{3}{8}$,,	30 12 12	$\frac{3}{32}$	1,066·66
$\frac{1}{4}$,,	20 8 8	$\frac{1}{16}$	1,600
$\frac{1}{8}$,,	10 4 4	$\frac{1}{32}$	3,200
$\frac{1}{16}$,,	5 2 2	$\frac{1}{64}$	6,400
$\frac{1}{32}$,,	2 11 1	$\frac{1}{128}$	12,800
$\frac{1}{64}$,,	1 5 12½	$\frac{1}{256}$	25,600

COPPER ORES SOLD in CORNWALL from 1729 to 1832.

Year.	Copper Ore. Tons.	Copper. Tons.	Cwt.	qr.	lb.	Amount. £.	s.	d.	Produce.	Standard. £.	s.	d.
1729	2,216	—				—			—	—		
1730	2,832	—				—			—	—		
1731	2,555	—				—			—	—		
1732	1,714	—				—			—	—		
1733	3,113	—				—			—	—		
1764	16,437	1,869	4	3	15	—			$11\frac{3}{5}$	—		
1765	18,425	2,089	6	3	14	—			$11\frac{3}{8}$	—		
1766	21,776	2,520	13	2	27	—			$11\frac{1}{2}$	—		
1767	19,636	2,016	3	0	22	—			$10\frac{1}{3}$	—		
1768	23,684	2,555	17	1	6	—			$10\frac{3}{4}$	—		
1769	26,353	2,706	15	3	0	—			$10\frac{1}{4}$	—		
1770	31,758	3,267	9	2	13	—			$10\frac{1}{4}$	—		
1771	28,091	3,073	7	1	25	—			$20\frac{7}{8}$	—		
1772	27,015	3,060	18	2	25	—			$11\frac{1}{4}$	—		
1773	27,654	3,152	1	0	24	—			11	—		

[The intervals from 1733 to 1764, and from 1773 to 1800, cannot be obtained.]

Year.	Copper Ore. Tons.	Copper. Tons.	Cwt.	qr.	lb.	Amount. £.	s.	d.	Produce.	Standard. £.	s.	d.
1800	55,981	5,187	0	3	7	550,925	1	0	$9\frac{1}{4}$	133	3	0
1801	56,611	6,267	18	3	10	476,313	1	0	$9\frac{1}{4}$	117	5	0
1802	53,937	5,228	15	3	5	445,094	4	0	$9\frac{5}{8}$	110	18	0
1803	60,566	5,615	16	0	21	533,910	16	0	$9\frac{1}{4}$	122	0	0
1804	64,637	5,374	18	1	20	570,840	11	0	$8\frac{3}{5}$	136	5	0
1805	78,452	6,234	5	0	6	862,410	16	0	$7\frac{7}{8}$	169	16	0
1806	79,269	6,863	10	2	13	730,845	6	6	$8\frac{5}{8}$	138	5	0
1807	71,694	6,716	12	1	26	609,002	13	0	$9\frac{3}{5}$	120	0	0
1808	67,867	6,795	13	2	25	495,303	1	6	0	100	7	0
1809	76,245	6,821	13	1	19	770,028	15	6	$8\frac{7}{8}$	143	12	0
1810	66,048	5,682	19	1	27	570,035	8	0	$8\frac{1}{2}$	132	5	0
1811	66,786	6,141	13	3	7	556,723	19	0	$9\frac{1}{8}$	120	12	0
1812	71,547	6,720	7	2	4	549,665	6	6	$9\frac{3}{8}$	111	1	0
1813	74,047	6,918	3	0	6	594,345	10	0	$9\frac{1}{4}$	115	7	0
1814	74,322	6,369	13	3	7	627,501	10	0	$8\frac{1}{2}$	130	12	0
1815	78,483	6,525	6	3	25	552,813	8	6	$8\frac{1}{4}$	117	16	0
1816	77,334	6,697	4	0	17	447,959	17	0	$8\frac{5}{8}$	98	13	0
1817	76,701	6,498	2	0	16	494,010	12	6	$8\frac{1}{2}$	108	10	0
1818	86,174	6,849	7	1	1	686,005	8	4	$7\frac{7}{8}$	134	15	0
1819	88,736	6,804	2	2	7	623,595	4	6	$7\frac{5}{8}$	127	10	0
1820	91,473	7,508	0	3	26	602,441	12	0	$8\frac{1}{8}$	113	15	0
1821	98,426	8,514	19	2	12	605,968	19	8	$8\frac{5}{8}$	103	0	0
1822	100,364	8,569	18	3	10	638,715	9	6	$8\frac{5}{8}$	106	14	0
1823	97,017	7,730	2	1	7	605,083	1	8	8	112	16	0
1824	103,710	8,004	9	2	19	636,741	2	11	$7\frac{3}{4}$	115	13	0
1825	110,964	8,468	6	1	20	820,215	13	11	$7\frac{5}{8}$	132	17	0
1826	122,846	9,767	17	2	3	708,268	11	7	8	107	0	0
1827	131,876	10,440	2	0	7	783,818	16	6	$7\frac{7}{8}$	109	16	0
1828	124,272	9,447	8	0	8	714,992	10	6	$7\frac{5}{8}$	112	0	0
1829	130,449	10,292	13	2	18	754,904	0	0	$7\frac{7}{8}$	100	10	0
1830	141,263	11,554	18	0	5	802,979	9	0	$8\frac{1}{8}$	108	2	0
1831	137,893	11,836	9	0	7	798,308	5	6	$8\frac{3}{8}$	99	9	0
1832	136,719	11,491	13	3	12	833,131	17	0	$8\frac{3}{8}$	105	4	0

From this period the returns are compiled from "Gryll's Annual Mining Sheet," and are made up to the 30th of June in each year, as shown in the following Tables.

AN ACCOUNT of Sales, by Public Ticketings, of British and Foreign Copper Ores in Cornwall and Swansea, from the 30th June, 1832, to the 30th June, 1849, showing the Averages of the per-centage of produce in metal, prices, computed quantities of fine Copper, with General Averages, Total Produce in Metal, and Money Value of the whole. Also giving the Value of Ore computed to produce a Ton of Copper.

In the Years ending	CORNWALL.					SWANSEA.					CORNWALL and SWANSEA Average.				
	Computed quantity of ore in tons of 21 cwt.	Average produce per cent.	Computed quantity of fine copper.	Average price of ore per ton of 21 cwt.	Total value in money.	Computed quantity of ore in tons of 21 cwt.	Average produce per cent.	Computed quantity of fine copper.	Average price of ore per ton of 21 cwt.	Total value in money.	Total produce of the whole in fine copper.	Total value of the whole in money.	Average value of the quantity of ore to make a ton of copper.	Average value of Cornish ore to make a ton of copper.	Average value of Swansea ore to make a ton of copper.
	Tons.		Tons.	£. s. d.	£.	Tons.		Tons.	£. s. d.	£.	Tons.	£.	£. s. d.	£. s. d.	£. s. d.
30th June, 1833	138,300	8	11,185	6 1 6	858,709	13,101	$8\frac{3}{4}$	1,158	7 5 0	95,008	12,343	953,717	77 5 4	76 15 5	82 0 10
1834	143,296	$7\frac{3}{4}$	11,225	6 4 0	887,902	18,112	$8\frac{3}{4}$	1,580	7 7 6	133,821	12,805	1,021,723	79 15 9	79 2 0	84 14 0
1835	150,617	$8\frac{1}{8}$	12,272	5 18 6	893,403	28,771	$9\frac{7}{8}$	2,833	7 15 6	223,990	15,105	1,117,393	73 19 5	72 15 10	79 1 3
1836	140,981	$8\frac{1}{4}$	11,640	6 17 0	957,752	34,366	$11\frac{1}{4}$	3,849	9 17 6	340,025	15,489	1,297.777	83 15 8	82 5 7	88 6 9
1837	140,753	$7\frac{5}{8}$	10,823	6 9 1	918,614	34,216	$11\frac{1}{2}$	3,960	9 18 0	338.976	14,783	1,257,590	85 1 4	84 17 6	85 12 0
1838	145,688	$7\frac{7}{8}$	11,527	5 17 6	857,780	42,931	$13\frac{3}{4}$	5,906	11 4 6	481,323	17,433	1,339,103	76 16 3	74 8 3	81 9 11
1839	159,551	$7\frac{3}{4}$	12,451	5 17 0	932,298	49,474	$14\frac{3}{4}$	7,296	12 1 6	597,996	19,747	1,530,294	77 9 10	74 1 5	81 19 3
1840	147,266	$7\frac{1}{2}$	11,038	5 7 6	792,758	56,279	15	8,473	11 19 6	674,012	19,511	1,466,770	75 3 6	71 16 5	79 10 11
1841	135,090	$7\frac{3}{8}$	9,987	6 1 6	819,949	59,378	$17\frac{5}{16}$	10,290	14 14 6	871,248	20,277	1,691,197	83 8 1	82 2 0	84 13 4
1842	135,581	$7\frac{5}{16}$	9,896	6 1 6	822,871	56,821	$16\frac{1}{2}$	9,378	14 5 0	808,182	19,274	1,631,053	84 12 5	83 3 0	86 3 7
1843	144,806	$7\frac{9}{16}$	10,926	5 11 0	804,446	60,554	$16\frac{1}{4}$	9,862	13 6 0	805,213	20,788	1,609.659	77 8 8	73 12 7	81 13 0
1844	152,667	$7\frac{3}{8}$	11,247	5 6 10	815,246	65,520	$16\frac{15}{16}$	11,108	13 9 4	882,568	22,355	1,697,814	75 18 9	72 12 3	79 9 0
1845	157,000	$7\frac{3}{4}$	12,239	5 6 3	835,351	62,950	$16\frac{7}{16}$	10,349	12 1 5	759,999	22,588	1,595,350	70 12 6	68 5 0	73 8 10
1846	158,913	$7\frac{13}{16}$	12,448	5 11 7	886,785	64,987	$15\frac{1}{16}$	9,788	11 10 6	748,915	22,236	1,635,700	73 11 2	71 6 4	76 10 3
1847	148,674	$8\frac{1}{16}$	11,966	5 11 9	830,739	53,284	$16\frac{3}{8}$	8,857	12 13 9	676,069	20,823	1,506,808	72 7 3	69 8 6	76 6 7
1848	155,616	$8\frac{1}{4}$	12,870	5 6 0	825.080	50,731	17	8,645	12 8 2	629,660	21,514	1,454,741	67 12 4	64 2 2	72 16 8
1849	144,983	$8\frac{5}{16}$	12,053	4 19 0	716,917	49,135	$18\frac{3}{8}$	9,011	12 5 6	604,245	21,064	1,321,163	62 14 5	59 9 7	67 1 2
Total Amt.	2,499,782		195,793		14,456,600	800,610		122,343		9,671,250	318,135	24,127,852			
Averages	147,046	7·832	11,517	5 15 8	850,388	47,095	15·261	7,197	12 1 7	568,897	18,714	1,419,285	75 16 10	73 16 9	79 0 11

SALES of BRITISH COPPER ORES in CORNWALL and SWANSEA, in the Six Years ending 30th June, 1849; with the Quantities and Value of Ore, the Averages in each Year, Quantities of Fine Copper in the Ore, Prices per Ton, Value in Money, &c.

		Tons of 21 cwt.	Average Produce per cent.	Fine Copper.	Average Price of Ore.	Value.	Total Value.	Quantities of Ore.	Average Produce per cent.	Fine Copper.	Average Price.	Value of Ore to a Ton of Copper.
				Tons.	£. s. d.	£.	£.	Tons.		Tons.	£. s. d.	£. s. d.
1844	Sales in Cornwall ..	152,667	$7\frac{3}{8}$	11,247	5 6 10	815,246	952,090	173,251	7·588	12,968	5 9 11	73 8 4
	Sales at Swansea ..	20,584	8·363	1,721	6 13 0	136,844						
1845	Sales in Cornwall ..	157,000	$7\frac{3}{4}$	12,239	5 6 3	835,351	951,355	176,026	7·883	13,818	5 8 1	68 17 0
	Sales at Swansea ..	19,026	8·301	1,579	6 1 11	116,004						
1846	Sales in Cornwall ..	158,913	$7\frac{13}{16}$	12,448	5 11 7	886,785	1,002,329	177,142	7·922	13,958	5 13 2	71 16 2
	Sales at Swansea ..	18,229	8·282	1,510	6 6 9	115,544						
1847	Sales in Cornwall ..	148,674	$8\frac{1}{16}$	11,966	5 11 9	830,739	921,879	163,571	8·134	13,160	5 12 9	70 1 0
	Sales at Swansea ..	14,897	8·015	1,194	6 2 4	91,140						
1848	Sales in Cornwall ..	155,616	$8\frac{1}{4}$	12,870	5 6 0	825,080	921,019	170,238	8·438	14,364	5 8 2	64 2 5
	Sales at Swansea ..	14,622	10·215	1,494	6 11 3	95,939						
1849	Sales in Cornwall ..	144,983	$8\frac{5}{16}$	12,053	4 19 0	716,917	783,036	155,865	8·438	13,043	5 0 6	60 0 8
	Sales at Swansea ..	10,822	9·094	990	6 1 6	66,119						
	Total Quantities ..	1,016,093		81,311			5,531,708	1,016,093		81,311		
	Aver. Amounts, &c.						921,951	169,349	8·002	13,552	5 8 11	68 0 7

SALES of FOREIGN COPPER ORES at SWANSEA, in the Six Years ending 30th June, 1849; with the Quantities and Value of Ore, the Averages in each Year, Quantities of Fine Copper in the Ore, Prices per Ton, Value in Money, &c.

		Tons of 21 cwt.	Average Produce per cent.	Fine Copper.	Average Price of Ore.	Value.	Total Value.	Quantities of Ore.	Average Produce per cent.	Fine Copper.	Average Price.	Value of Ore to a Ton of Copper.
				Tons.	£. s. d.	£.	£.	Tons.		Tons.	£. s. d.	£. s. d.
1844	Total sales at Swansea..	65,520	$16\frac{15}{16}$	11,108	13 9 4	882,568	745,724	44,936	20·872	9,387	16 11 11	79 8 11
	Less British ores	20,584	8·363	1,721	6 13 0	136,844						
1845	Total sales at Swansea..	62,950	$16\frac{7}{16}$	10,349	12 1 5	759,999	643,995	43,924	19·967	8,770	14 13 3	73 8 8
	Less British ores	19,026	8·301	1,579	6 1 11	116,004						
1846	Total sales at Swansea..	64.987	$15\frac{1}{16}$	9,788	11 10 6	748,915	633,371	46,758	17.703	8,278	13 10 11	76 10 3
	Less British ores	18,229	8·282	1,510	6 6 9	115,544						
1847	Total sales at Swansea..	53,284	$16\frac{5}{8}$	8,857	12 13 9	676,069	584,929	38,387	19·834	7,663	15 4 9	76 6 8
	Less British ores	14,897	8·015	1,194	6 2 4	91,140						
1848	Total sales at Swansea..	50,731	17	8,645	12 8 2	629,660	533,721	36,109	19·804	7,151	14 15 7	74 12 9
	Less British ores	14,622	10·215	1,494	6 11 3	95,939						
1849	Total sales at Swansea .	49,135	$18\frac{3}{8}$	9,011	12 5 6	604,246	538,127	38,253	21·057	8,021	14 1 4	67 1 10
	Less British ores	10,882	9·094	990	6 1 6	66,119						
	Total Quantities						3,679,867	248,367		49,270		
	Average Amounts, &c...						613,311	41,394	19·838	8,212	14 16 4	74 13 8

QUANTITIES of COPPER contained in Ores purchased by Smelters in Six Years ending 30th June, 1849; distinguishing British and Foreign produce, Quantities purchased at Ticketings, imported by Smelters, or bought by Private Contract, aggregate Value, &c.

		Copper produced from British Ores.			Copper produced from Foreign Ores.				From British Ores.	From Foreign Ores.	
		Purchased at Ticketings in Cornwall & Swansea.	Purchased by Private Contract	Total British Ores.	Purchased at Ticketings at Swansea.	Imported and bought by Private Contract.	Total Foreign Ores.	Total Purchases.	Total Value of British Ores, computed at Average Prices.	Total Value of Foreign Ores, at Average Prices.	Total Value.
		Copper Tons.	Copper Tons.	Copper Tons.	Copper Tons.	Copper Tons.	Copper Tons.	Copper Tons.	£.	£.	£.
1844	.. ..	12,968	1,873	14.841	9,387	3,287	12,674	27,515	1,089,603	1,006,851	2,096.454
1845	.. ..	13,818	1,121	14,939	8,770	2,106	10,876	25 815	1,028,535	798,528	1,827,063
1846	.. ..	13,958	997	14.955	8,278	2,814	11,092	26,047	1,073,924	848,677	1.922,601
1847	.. ..	13,160	625	13,785	7,663	1,377	9,040	22,825	965,661	690,038	1,655,699
1848	.. ..	14,364	* 356	14,720	7,151	* 1,312	8,463	23,183	943,846	631,643	1,575,489
1849	.. ..	13,043	* 500	13,543	8,021	* 1,000	9,021	22,563	813,031	605,219	1,418,250
	Total Amounts..	81,311	5,472	86,783	49,270	11,896	61,166	147,948	5,914,600	4,580,956	10,495,556
	Average per Ann.	13,552	912	14,464	8,211	1,983	10,194	24,658	985,767	763,493	1,749,259

NOTE.—The four quantities in 1848 and 1849, marked with an asterisk, are not given as correct. The previous figures in the table may be relied upon. Those standing against 1849, being even sums, will be understood to be matter of computation. It is certain, however, that considerable parcels, especially of foreign ores, were purchased by private contract, or imported; and the quantities here given may be regarded as quite below the amounts so purchased.

Quantities of COPPER ORE imported from CHILI, which paid Duty, in the Five Years 1843 to 1847 inclusive.

Year.	Copper Ore which paid Duty.	Metallic Copper charged with Duty.	Average per cent. of Metal in the Ore.	Amount of Duty received.	Rate of Duty computed at per Ton of Ore.	Rate of Duty computed at per Ton of Metal.	Mean Price of Cake Copper.	Rate per cent. of Duty on value of Copper.
	Tons.	Tons.		£.	£. s. d.	£. s. d.	£. s. d.	
1843	19,364	5,590	28·86	34.308	1 15 5	6 2 8	83 5 0	7·367
1844	19,302	5,646	29·25	34,749	1 16 0	6 3 1	85 5 0	7·219
1845	10,824	3,624	33·48	22,562	2 1 8	6 4 6	88 10 0	7·034
1846	12,982	4,221	32·51	25,983	2 0 0	6 3 1	90 15 0	6·781
1847	8,665	3,079	35·53	19,260	2 4 6	6 5 1	96 10 0	6·480
Totals....	71,137	22,160	31·15	136,862	1 18 6	6 3 6	88 17 0	6·950

Quantities of COPPER ORE imported from CUBA, which paid Duty, in the Five Years 1843 to 1847 inclusive.

Year.	Copper Ore which paid Duty.	Metallic Copper charged with Duty.	Average per cent. of Metal in the Ore.	Amount of Duty received.	Rate of Duty computed at per Ton of Ore.	Rate of Duty computed at per Ton of Metal.	Mean Price of Cake Copper.	Rate per cent. of Duty on value of Copper.
	Tons.	Tons.		£.	£. s. d.	£. s. d.	£. s. d.	
1843	31,355	5,279	16·84	26,226	0 16 9	4 19 4	83 5 0	5·966
1844	34,970	6,605	18·88	35,054	1 0 1	5 6 2	85 5 0	6·227
1845	41,171	6,602	16·04	31,747	0 15 5	4 16 2	88 10 0	5·433
1846	31,937	4,935	15·45	22,963	0 14 5	4 13 0	90 15 0	5·124
1847	23,897	3,843	16·08	17,816	0 14 10	4 12 9	96 10 0	4·806
Totals....	163,330	27,264	16·69	133,806	0 16 5	4 18 2	88 17 0	5·243

Quantities of COPPER ORE imported from AUSTRALIA and other BRITISH POSSESSIONS, in the Five Years 1843 to 1847 inclusive.

Years.	Copper Ore which paid Duty.	Metallic Copper charged with Duty.	Average per cent. of Metal in the Ore.	Amount of Duty received.	Rate of Duty computed at per Ton of Ore.	Rate of Duty computed at per Ton of Metal.	Mean Price of Cake Copper.	Rate per cent. of Duty on value of Copper.
	Tons.	Tons.		£.	£. s. d.	£. s. d.	£. s. d.	
1843	13	Not assayed.	..	14	..	..	83 5 0	Not assayed.
1844	157	15	9·55	15	0 1 11	1 1 0	85 5 0	1·232
1845	969	187	19·30	198	0 4 1	1 1 0	88 10 0	1·186
1846	3,753	819	21·82	860	0 4 7	1 1 0	90 15 0	1·157
1847	6,722	1,626	24·19	1,725	0 5 2	1 1 0	96 10 0	1·088
Totals....	11,601	2,647	22·82	2,798	0 4 10	1 1 0	88 17 0	1·182

Quantities of FOREIGN COPPER ORE which paid Duty in the UNITED KINGDOM, in the Five Years 1843 to 1847 inclusive.

Year.	Copper Ore which paid Duty.	Metallic Copper charged with Duty.	Average per cent. of Metal in the Ore.	Amount of Duty received.	Rate of Duty computed at per Ton of Ore.	Rate of Duty computed at per Ton of Metal.	Mean Price of Cake Copper.	Rate per cent. of Duty on value of Copper.
	Tons.	Tons.		£.	£. s. d.	£. s. d.	£. s. d.	
1843	54,370	11,654	21·43	64,445	1 3 8½	5 10 7	83 5 0	6·641
1844	58,591	13,190	22·51	75,201	1 5 8	5 14 0	85 5 0	6·685
1845	56,119	11,172	19·90	58,646	1 0 10¾	5 5 0	88 10 0	5·932
1846	50,944	10,661	20 92	54,056	1 0 2½	5 1 5	90 15 0	5·587
1847	40,491	9,033	22·31	40,964	1 0 3	4 10 8	96 10 0	4·697
Totals....	260,515	55,710	21·38	293.312	1 2 6	5 5 4	88 17 0	5·927

NOTE.—The amount for 1848 has been presented to Parliament monthly; a statement which, with the Annual Returns, is introduced in another place. Since the passing of the Act of 1848, admitting the Foreign Ores to a nominal duty without regard to produce, the details furnished in the Tables annexed to this have not been continued.

IMPORTS of FOREIGN COPPER and COPPER ORE into the United Kingdom, from 1832 to 1849, inclusive.

France.

Year end. Jan. 5.	Copper unwrought	Part wrought.	Plates and coin.	Old, for remanu-facture.	Ore.	Copper Manufactures. Weight.	Copper Manufactures. Value.		
	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	£.	s.	d.
1832	—	—	0 0 0 2	0 8 0 25	—	—	2,258	0	6
1833	—	—	0 2 1 22	—	—	—	2,883	18	6
1834	—	—	0 0 0 10	—	—	—	2,345	2	10
1835	0 0 0 2	—	—	—	—	0 6 3 4	1,555	0	6
1836	—	—	0 2 0 11	—	—	1 13 2 2	2,287	16	0
1837	—	—	—	—	—	—	5,914	16	4
1838	—	—	0 1 1 2	—	—	—	1,601	13	0
1839	—	0 0 2 15	0 0 1 20	—	—	0 0 0 6	2,543	19	0
1840	—	0 1 2 4	0 0 3 14	2 7 2 2	—	—	1,897	14	0
1841	0 1 0 0	0 0 1 21	0 0 0 15	—	0 2 0 0	—	1,780	3	6
1842	0 10 0 0	0 1 1 23	0 0 0 4	—	0 1 1 25	—	1,451	0	6
1843	—	—	0 0 1 14	—	9 2 1 14	—	1,936	6	6
1844	21 13 1 15	—	0 0 0 5	0 13 3 12	0 0 0 12	—	2,788	4	10
1845	—	—	0 0 0 14	1 12 3 14	0 2 1 19	1 15 0 10	2,348	18	11
1846	—	—	0 0 2 14	—	3 15 0 0	—	2,394	19	2
1847	—	—	—	1 2 1 5	118 4 0 0	—	3,059	2	7
1848	—	—	0 0 2 3	0 9 2 20	32 4 0 12	0 1 1 4	2,841	10	0
1849	94 14 0 23	9 7 1 4	—	0 18 1 4	45 6 0 0	—	2,704	18	0

Germany.

Year end. Jan. 5.	Copper unwrought	Part wrought.	Plates and coin.	Old, for remanu-facture.	Ore.	Copper Manufactures. Weight.	Copper Manufactures. Value.		
	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	£.	s.	d.
1834	0 9 3 15	0 2 3 19	0 13 3 14	0 10 2 12	—	—	1,518	4	0
1835	—	0 1 3 11	—	1 8 2 10	—	0 4 3 8	2,161	10	4
1836	0 0 0 21	0 3 2 3	0 0 0 1	3 9 3 5	—	5 19 1 20	2,903	19	6
1837	—	2 11 3 8	—	7 4 3 19	8 8 2 25	28 2 2 0	2,061	5	2
1838	—	0 3 0 7	—	0 2 2 14	2 0 19	12 6 0 22	1,211	13	4
1839	—	0 15 2 8	0 0 0 22	0 5 3 17	125 18 0 27	1 4 2 19	1,366	8	2
1840	—	0 5 2 14	—	2 1 2 6	—	3 15 0 0	313	12	0
1841	—	—	0 0 1 25	0 19 0 20	—	10 17 1 7	327	2	6
1842	—	—	0 0 0 7	0 3 3 21	33 0 0 0	28 18 0 21	249	11	0
1843	—	0 0 2 23	—	—	—	12 14 3 20	557	7	6
1844	—	0 1 3 7	0 0 3 12	1 10 0 0	—	5 3 0 2	101	6	6
1845	—	0 6 2 23	1 14 3 8	4 12 3 8	—	6 6 1 16	204	0	0
1846	—	—	3 13 0 10	1 11 0 24	0 1 0 0	10 15 1 17	295	0	0
1847	—	1 0 0 18	0 17 2 7	—	—	11 14 2 21	402	4	0
1848	0 1 9 0	0 1 0 9	0 18 2 18	5 18 2 25	—	24 0 2 24	520	0	6
1849	—	2 0 0 0	3 6 1 20	4 14 3 6	—	—	1,152	5	11

Italy.

Year end. Jan. 5.	Copper unwrought	Part wrought.	Plates and coin.	Old, for remanu-facture.	Ore.	Copper Manufactures. Weight.	Copper Manufactures. Value.		
	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	£.	s.	d.
1832	—	—	0 0 0 2	—	—	—	7	0	0
1833	—	—	0 0 1 23	—	—	—	2	5	0
1834	—	—	—	—	—	—	6	5	0
1835	—	—	0 0 0 20	—	2 7 1 20	—	9	5	0
1836	—	—	—	0 2 3 14	—	1 2 0 6	1	5	0
1837	13 13 1 19	—	—	—	—	0 17 0 22	24	5	0
1838	41 1 0 23	—	—	—	16 11 2 2	0 4 1 9	13	0	0
1839	—	—	—	—	—	—	3	0	0
1840	4 15 3 20	—	0 0 1 7	—	30 19 0 12	—	13	18	0
1841	0 5 2 11	—	0 0 3 20	—	102 13 1 14	—	1	19	0
1842	—	—	0 0 2 16	—	245 10 0 24	—	28	3	0
1843	—	—	0 0 0 2	—	324 9 1 4	—	—		
1844	0 0 2 14	—	0 0 1 0	—	365 17 3 24	2 14 0 17	159	0	0
1845	0 8 1 26	—	—	0 3 1 24	558 10 3 8	0 14 2 3	10	10	0
1846	—	—	0 0 1 5	—	640 11 2 14	1 19 0 1	58	12	6
1847	—	—	0 0 1 23	0 11 2 8	576 16 2 2	1 6 3 6	37	0	0
1848	—	—	—	2 11 3 16	207 2 3 3	0 10 1 13	130	0	0
1849	9 0 0 0	—	—	1 12 1 13	123 3 3 6	—	63	5	0

Russia.

Year end. Jan. 5.	Copper unwrought	Part wrought.	Plates and coin.	Old, for remanufacture.	Ore.	Copper Manufactures. Weight.	Copper Manufactures. Value.
	T. ct.q.lb.	T. ct.q.lb.	T. ct.q.lb.	T. ct.q.lb.	T. ct.q.lb.	T. ct.q.lb.	£. s. d.
1832	—	—	—	0 0 3 12	—	—	—
1833	—	—	—	—	—	—	—
1834	5 1 2 9	0 0 0 0	—	0 5 0 0	0 0 0 18	—	—
1835	5 1 0 23	26 19 1 18	—	—	—	—	7 10 0
1836	9 1 2 4	16 1 1 14	—	—	—	—	41 15 0
1837	0 0 3 22	—	—	—	0 3 1 11	—	4 0 0
1838	—	—	—	0 0 3 20	—	—	5 0 0
1839	—	—	—	1 1 3 5	—	—	—
1840	—	—	—	0 8 0 23	—	—	—
1841	—	—	—	—	—	—	3 0 0
1842	—	—	—	—	—	—	22 0 0
1843	—	—	—	0 0 2 24	—	—	46 15 6
1844	3 4 1 8	—	0 0 0 1	1 8 0 7	—	0 17 0 16	2 17 0
1845	—	—	—	—	—	—	96 15 0
1846	—	—	1 5 2 14	—	—	1 12 2 16	62 10 0
1847	32 2 3 2	—	—	0 12 3 4	—	—	3 0 0
1848	—	—	—	0 1 0 0	—	—	14 15 0
1849	—	—	3 0 0 0	0 11 1 24	—	—	8 10 0

Holland.

Year end. Jan. 5.	Copper unwrought	Part wrought.	Plates and coin.	Old, for remanufacture.	Ore.	Copper Manufactures. Weight.	Copper Manufactures. Value.
1834	—	—	0 2 0 25	—	—	—	8 0 0
1835	—	—	—	0 2 0 1	43 18 0 20	4 5 2 25	1 10 0
1836	0 0 0 7	—	0 0 0 4	—	—	23 3 2 23	59 0 0
1837	0 17 3 16	0 1 3 12	—	0 0 3 21	57 8 0 0	9 2 0 16	72 1 6
1838	—	—	—	—	35 16 0 0	10 18 0 13	24 19 6
1839	—	—	0 0 0 7	—	38 0 0 0	—	59 5 0
1840	1 14 2 7	0 0 1 12	—	0 0 3 0	50 0 0 0	—	100 0 0
1841	—	—	—	—	40 6 0 0	0 1 0 20	65 3 0
1842	—	—	0 0 0 14	—	90 1 0 0	3 0 3 18	512 3 0
1843	—	—	—	—	13 5 2 0	23 17 2 5	288 6 0
1844	—	0 0 1 6	—	—	63 18 2 14	33 2 3 6	114 10 0
1845	—	0 1 2 23	0 0 2 0	—	89 16 3 25	15 8 0 15	296 5 0
1846	—	0 1 0 22	—	—	110 5 3 11	27 9 3 3	670 15 0
1847	—	—	—	0 13 2 9	2 12 3 3	32 12 0 10	1,033 17 0
1848	—	0 1 0 18	—	—	76 10 0 0	14 10 0 3	221 1 0
1849	—	—	—	19 8 0 16	10 10 1 9	—	3,948 12 6

Norway.

Year end. Jan. 5.	Copper unwrought	Part wrought.	Plates and coin.	Old, for remanufacture.	Ore.	Copper Manufactures. Weight.	Copper Manufactures. Value.
1835	—	—	—	0 2 1 5	116 5 2 10	—	—
1836	—	—	—	—	507 11 0 13	—	—
1837	—	—	—	—	182 17 1 16	—	—
1838	—	—	—	—	—	—	—
1839	—	—	—	—	—	—	—
1840	—	—	—	0 4 2 17	—	—	—
1841	—	—	73 17 0 11	—	57 8 2 14	—	—
1842	—	—	—	1 18 1 25	—	—	—
1843	79 9 1 10	—	50 10 0 5	—	39 6 1 0	—	—
1844	—	45 14 3 22	23 12 1 2	—	5 10 1 20	—	—
1845	140 5 3 6	—	—	—	3 18 1 9	—	—
1846	69 9 2 13	—	—	—	4 7 2 21	—	—
1847	—	69 19 0 4	—	—	—	—	—
1848	32 17 3 27	—	—	0 0 2 19	0 0 1 0	—	334 10 0
1849	—	62 12 3 11	—	—	—	—	—

Sweden.

Year end. Jan. 5.	Copper unwrought	Part wrought.	Plates and coin.	Old, for remanufacture.	Ore.	Copper Manufactures. Weight.	Copper Manufactures. Value.
	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	£. s. d.
1832	—	—	—	—	714 14 0 0	—	—
1833	—	0 0 1 17	—	—	366 6 0 32	—	10 0 0
1834	—	—	—	—	789 18 2 9	—	—
1835	—	—	—	—	635 0 3 10	—	—
1836	—	—	—	—	493 9 0 26	—	—
1837	11 14 2 11	—	—	—	1,905 8 3 18	—	—
1838	—	—	—	1 16 2 3	1,469 10 0 0	—	—
1839	45 7 3 21	—	—	—	718 15 2 11	—	—
1840	277 11 2 8	—	—	—	501 18 0 0	—	2 0 0
1841	191 18 1 14	—	—	—	23 10 0 0	—	—
1842	126 6 0 3	—	—	—	16 12 0 14	—	5 0 0
1843	55 11 2 21	—	—	0 6 1 8	—	—	—
1844	—	—	—	—	—	—	0 5 0
1845	—	—	—	—	—	—	—
1846	—	2 0 0 15	—	—	—	—	—
1847	—	—	—	—	—	—	—
1848	—	—	—	0 7 3 24	—	—	—
1849	2 0 0 6	1 19 3 27	—	—	—	—	—

SUMMARY.

Imports of Copper and Copper Ore from the whole of Europe into the United Kingdom from 1832 to 5th January, 1849.

Copper unwrought, in bricks or pigs, rose copper, and cast copper.	Part wrought bars, rods, or ingots, hammered or raised.	Plates and coin.	Old, for remanufacture.	Ore.	Copper Manufactures. Entered by Weight.	Copper Manufactures. Entered by Value.
T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	T. ct. q. lb.	£. s. d.
*23 16 0 25	0 1 3 11	0 0 1 11	1 14 0 5	714 14 0 4	—	2,920 13 4
8 11 0 26	0 4 1 0	0 3 1 0	5 11 2 24	400 4 2 16	—	4,589 16 10
11 8 0 6	0 2 3 19	0 16 0 22	2 6 3 23	880 18 2 6	—	3,878 11 10
27 0 1 16	28 6 0 1	0 0 0 22	2 1 3 7	851 10 3 24	4 17 1 9	3,739 14 10
17 15 0 23	16 4 3 17	0 2 0 16	5 10 1 13	1,065 9 1 21	31 18 2 23	5,326 2 0
334 17 2 18	4 15 1 7	0 0 0 1	7 5 3 12	2,173 16 2 25	38 1 3 0	8,081 0 0
177 2 3 14	0 3 0 7	0 1 1 4	3 12 2 9	1,522 0 2 1	23 8 2 16	2,889 11 4
55 7 3 21	0 16 0 23	0 0 3 13	1 12 1 13	882 13 3 21	1 8 2 3	4,002 17 2
287 6 0 13	0 7 2 2	0 1 0 21	7 15 1 12	582 17 2 21	3 15 0 0	2,336 3 6
162 4 3 25	0 0 1 21	74 0 1 26	2 8 2 3	226 11 1 3	10 18 1 27	2,190 18 0
126 16 0 3	0 1 1 23	0 0 3 18	4 2 0 20	385 4 3 7	31 19 0 11	2,274 17 6
141 8 3 2	0 0 2 33	50 10 2 12	0 16 3 11	394 18 3 8	36 12 1 25	2,838 0 0
28 15 0 5	86 6 1 0	54 5 1 20	4 15 0 22	672 18 3 0	41 17 0 13	3,217 1 4
140 14 1 4	0 8 1 18	1 15 2 4	6 10 3 11	674 5 1 20	35 18 3 1	2,990 18 11
69 10 0 3	2 1 3 20	5 0 2 27	1 11 1 15	860 18 2 26	49 11 0 15	3,634 17 8
44 9 0 1	70 19 0 22	0 18 0 2	3 11 0 8	715 17 2 16	49 2 1 2	4,689 9 7
194 0 0 17	70 7 0 6	59 18 0 13	6 10 0 12	316 6 2 5	42 15 1 0	4,222 11 6
105 14 1 1	76 1 2 14	7 0 1 0	28 11 0 14	302 3 1 23		8,076 11 5

* In this table the returns are also made up for the years 1832-48·

QUARTERLY SALES of COPPER ORES in CORNWALL for the Six Years ending 31st December, 1849.

Quarter ending	Tons.	£.	s.	d.
Quarter ending March 31, 1844	39,874	219,019	3	0
,, ,, June 30, ,,	37,306	188,721	8	0
,, ,, Sept. 30, ,,	38,073	195,626	17	6
,, ,, Dec. 31, ,,	37,716	198,066	16	0
Total	Tons 152,969	£801,434	4	6
Quarter ending March 31, 1845	40,367	215,284	3	0
,, ,, June 30, ,,	40,844	226,373	3	0
,, ,, Sept. 30, ,,	42,420	250,257	1	6
,, ,, Dec. 31, ,,	38,926	228,019	18	6
Total	Tons 162,557	£919,934	6	0
Quarter ending March 31, 1846	39,335	207,697	10	0
,, ,, June 30, ,,	32,232	200,810	11	6
,, ,, Sept. 30, ,,	37,784	196,486	16	0
,, ,, Dec. 31, ,,	35,079	191,197	9	0
Total	Tons 144,430	£796,192	6	6
Quarter ending March 31, 1847	38,071	222,542	9	0
,, ,, June 30, ,,	34,875	204,662	4	6
,, ,, Sept. 30, ,,	40,174	229,969	2	6
,, ,, Dec. 31, ,,	40,000	216,262	14	0
Total	Tons 153,120	£873,436	10	0
Quarter ending March 31, 1848	37,537	202.517	9	0
,, ,, June 30, ,,	37,905	176,330	17	0
,, ,, Sept. 30, ,,	36,287	164,409	10	6
,, ,, Dec. 31, ,,	35,972	176,833	0	6
Total	Tons 147,701	£720,090	17	0
Quarter ending March 31, 1849	36,093	188,507	0	6
,, ,, June 30, ,,	36,631	187,167	15	6
,, ,, Sept. 30, ,,	37,103	194,495	11	6
,, ,, Dec. 31, ,,	36,508	193,444	11	6
Total	Tons 146,335	£763,614	19	0

QUARTERLY SALES of COPPER ORES in CORNWALL, for the Year 1849.

Quarter ending	Ore, in Tons of 21 Cwts.	Fine Copper.	Amount of Money.			Averg. per cent.	Average Standard.			Per Ton.		
			£.	s.	d.		£.	s.	d.	£.	s.	d.
March 31 ..	36,093	2,981 11	188,507	0	6	$8\frac{1}{4}$	98	12	0	5	4	5
June 30 ..	36,631	2,906 14	187,167	15	6	$7\frac{7}{8}$	98	16	2	5	2	2
September 30 ..	37,103	2,992 17	194,495	11	6	$8\frac{1}{8}$	97	14	1	5	4	10
December 31 ..	36,508	2,810 2	193,444	11	6	$7\frac{3}{4}$	104	10	11	5	5	7
	146,335	11,691 4	763,614	19	0	8	99	18	3	5	4	3

ACCOUNT of SALES of COPPER ORES in CORNWALL, 1849.

Date of Sale.	Average Standard.	Av. Produce.	Price.	Quantity of Ore.	Computed Quantity of Fine Copper.	Amount of Sales.	Value of Ore to produce 1 Ton of Copper.
	FIRST QUARTER.						
	£. s. d.		£. s. d.	21 cwts.	Tons.cwts.	£. s. d.	£. s. d.
January 11	87 7 0	8⅜	4 12 6	1,813	152 18	8,376 13 0	54 15 8
,, 18	84 12 0	9¾	5 9 0	2,633	255 3	14,346 18 6	56 4 7
,, 25	93 10 0	7⅞	4 13 0	3,841	304 0	17,874 10 0	58 16 0
February 1	95 16 0	7⅜	4 6 0	3,983	293 0	17,166 12 0	58 11 9
,, 8	91 16 0	9	5 10 0	2,145	192 19	11,819 1 0	61 5 1
,, 22	90 8 0	9⅝	5 18 6	2,990	287 0	17,723 1 0	61 15 1
March 1	104 0 0	7	4 10 6	2,564	178 14	11,535 16 6	64 11 1
,, 8	105 18 0	8	5 14 6	3,684	278 6	19,832 16 6	71 5 3
,, 15	104 12 0	8⅝	6 5 6	2,677	231 2	16,818 1 0	72 15 6
,, 22	99 7 0	9½	6 13 0	2,885	272 7	19,122 0 0	70 4 3
,, 29	107 5 0	7½	5 6 0	3,665	276 10	19,598 6 6	70 17 7
Totals	98 12 0	8¼	5 4 5	36,093	2,981 11	188,507 0 5	63 4 6
	SECOND QUARTER.						
April 5	106 13 0	7⅝	5 6 0	3,942	298 8	20,997 8 6	70 7 4
,, 12	104 14 0	8¼	5 18 0	2,547	210 12	15,048 10 0	71 9 1
,, 19	99 17 0	9⅝	6 16 6	2,741	262 15	18,699 8 6	71 3 4
,, 26	112 3 0	6¾	4 13 6	2,671	176 5	12,423 5 6	70 9 9
May 3	105 8 0	7⅝	5 6 6	3,791	290 11	20,206 0 0	69 10 11
,, 10	100 9 0	8⅛	5 8 6	2,584	210 19	14,092 6 6	66 16 1
,, 17	93 18 0	9¾	6 7 6	2,393	232 15	15,273 11 0	65 12 7
,, 24	98 5 0	7⅛	4 5 0	3,961	281 7	16,735 18 6	59 9 8
,, 31	93 1 0	7¾	4 9 0	3,948	305 18	17,612 1 0	57 11 2
June 7	90 14 0	8	4 11 0	2,496	201 7	11,407 19 6	56 13 2
,, 21	86 16 0	9	5 2 0	2,929	264 18	14,916 18 0	56 8 6
,, 28	99 3 0	6½	3 14 0	2,628	170 19	9,724 8 6	56 17 8
Totals	98 16 2	7·935	5 2 2	36,631	2,906 14	187,167 15 6	64 7 10
	THIRD QUARTER.						
July 5	96 17 0	7⅝	4 13 0	3,598	274 6	16,679 0 6	60 16 1
,, 12	94 9 0	8¾	5 10 6	2,538	221 2	13,913 5 0	62 18 6
,, 19	91 11 0	10	6 9 0	2,115	212 14	13,662 17 0	64 4 8
,, 26	100 0 0	7¼	4 10 6	3,623	264 6	16,473 4 6	62 6 7
August 2	98 14 0	7¼	4 8 0	3,881	280 15	17,037 2 6	60 13 8
,, 9	95 19 0	8⅝	5 10 6	2,595	224 2	14,363 0 6	64 1 10
,, 23	94 1 0	9¾	6 2 6	3,041	296 19	18,624 9 6	62 14 5
,, 30	108 2 0	6⅛	3 18 0	2,977	183 0	11,599 15 6	63 2 3
Septemb. 6	103 3 0	7⅞	5 8 0	3,801	300 10	20,549 12 6	68 7 8
,, 13	103 16 0	8¼	5 16 6	2,677	220 16	15,563 15 6	70 9 9
,, 20	99 17 0	9½	6 14 0	2,467	233 0	16,475 3 0	70 14 2
,, 27	106 10 0	7⅜	5 2 6	3,790	281 7	19,554 5 6	69 10 0
Totals	97 14 1	8·066	5 4 10	37,103	2,992 17	194,495 11 6	64 19 9
	FOURTH QUARTER.						
October 4	106 7 0	7⅛	4 16 0	3,998	283 6	19,126 13 0	67 10 3
,, 11	102 7 0	8¾	6 1 0	1,926	164 19	11,587 15 6	70 5 0
,, 18	98 1 0	9½	6 10 6	2,594	245 9	16,938 10 6	69 0 2
,, 25	110 8 0	6⅛	4 0 6	2,713	166 7	10,906 6 0	65 11 3
Novem. 1	104 8 0	7⅝	4 18 6	3,965	291 6	19,516 2 6	66 19 11
,, 8	102 1 0	8⅛	5 11 0	2,577	209 5	14,267 8 6	68 3 8
,, 22	97 16 0	9⅛	6 11 0	2,358	224 13	15,494 6 6	68 19 5
,, 29	108 0 0	7	4 16 0	4,220	293 16	20,121 16 0	68 9 9
Decem. 6	108 15 0	7¼	5 2 6	4,364	317 8	22,527 2 0	70 19 6
,, 13	104 18 0	8	5 12 0	2,887	229 8	16,124 19 0	70 5 10
,, 20	100 18 0	9	6 7 0	2,527	228 1	16,059 16 0	70 8 5
,, 27	110 17 0	6⅝	4 10 6	2,379	156 4	10,773 16 0	68 19 6
Totals	104 10 11	7·696	5 5 7	36,508	2,810 2	193,444 11 6	68 16 9

PURCHASERS of COPPER ORES at TICKETINGS, in CORNWALL, in the Year 1849.

Names of Companies.	First Quarter.		Second Quarter.		Third Quarter.		Fourth Quarter.		Total.	
	Tons.	Amount.	Tons.	Amount.	Tons.	Amount.	Tons.	Amount.	Tons.	Amount.
		£. s. d.		£. s. d.		£. s. d.		£. s. d.		£. s. d.
Williams & Co. ..	8,619	50,559 6 11	9,660	53,201 17 9	7,558	46,272 4 0	9,289	54,714 7 9	35,126	204,747 19 5
Vivian & Sons ..	7,436	39,893 6 8	7,732	40,287 12 3	8,754	45,480 16 6	7,364	40,726 0 10	31,286	166,387 16 3
Grenfell & Sons..	6,120	30,332 0 6	5,644	27,405 5 5	4,934	25,316 1 6	5,071	24,212 12 7	21,769	113,266 0 0
Sims & Co... ..	5,429	25,058 4 5	5,512	26,380 7 1	5,318	25,826 5 9	5,108	24,635 11 0	21,367	101,900 8 3
Freeman & Co. ..	4,580	22,861 15 6	4,661	23,933 11 11	4,582	22,563 4 11	4,829	23,501 13 10	18,652	92,860 6 2
Mines Royal ..	2,473	13,977 9 8	1,971	8,409 13 1	2,851	13,929 0 6	2,444	13,162 2 4	9,739	49,478 5 7
Schneider & Co...	990	5,038 6 6	1,210	6,108 9 11	2,843	13,569 2 4	2,087	10,278 10 11	7,130	34,994 9 8
Crown Copper ..	176	686 10 3	241	1,440 18 1	263	153 16 0	316	2,213 0 1	996	4,494 4 5
Total	36,093	188,507 0 6	36,631	187,167 15 6	37,103	194,495 11 6	36,508	193,444 11 6	146,335	763,614 19 0

PURCHASERS of COPPER ORES at TICKETINGS, in SWANSEA, in the Year 1849.

Names of Companies.	First Quarter.				Second Quarter.				Third Quarter.				Fourth Quarter.				Total.			
	Tons.	Amount.			Tons.	Amount.			Tons.	Amount.			Tons.	Amount.			Tons.	Amount.		
		£	s.	d.		£	s.	d.		£	s.	d.		£	s.	d.		£	s.	d.
Williams & Co. ..	2,174	27,061	4	0	3,633	52,039	9	9	2,563	26,721	18	5	2,643	35,910	17	6	11,813	141,733	9	8
Vivian & Sons ..	2,030	23,976	19	4	3,972	51,492	13	6	1,794	15,632	17	0	2,170	26,675	6	6	9,966	117,827	16	6
Grenfell & Sons ..	1,136	11,599	12	0	2,286	28,371	13	6	1,873	18,012	6	0	1,252	15,919	12	6	6,547	73,913	4	0
Sims & Co.	1,093	13,527	5	0	1,633	23,855	14	5	1,055	16,749	6	0	1,233	20,004	10	0	5,014	74,136	15	5
Freeman & Co. ..	215	2,876	9	6	746	10,459	2	11	604	4,882	15	0	625	5,175	15	6	2,190	49,286	19	5
Schneider & Co. ..	642	9,980	2	0	859	15,277	11	2	580	10,042	17	0	524	9,072	15	9	2,603	44,373	5	11
English Copper ..	473	6,473	0	10	847	10,484	10	0	758	7,770	14	11	684	9,555	15	3	2,762	33,784	1	0
Crown Copper.. ..	176	686	10	3	241	1,440	18	1	..	..	..		136	1,224	6	6	653	3,351	14	10
Mines Royal	90	1,693	12	10	411	4,956	5	9	..	..	..		371	5,216	5	3	872	11,866	3	10
B. Smith	40	593	0	0	538	9,629	7	6	129	2,172	5	0	785	15,949	11	6	1,492	28,344	4	0
British and Foreign Copper Co.	..	..	..		..	..	..		207	3,319	1	5	535	8,597	0	9	742	11,916	2	2
Mason & Elkington	..	..	..		..	..	..		..	..	..		254	4,389	12	6	254	4,389	12	6
	7,893	97,781	5	6	14,925	206,206	8	6	9,563	104,914	1	6	11,212	157,694	0	6	33,595	564,595	16	0

PRODUCE of LEAD ORE and LEAD in the UNITED KINGDOM, for the Year 1848.

By Robert Hunt, Esq., Keeper of the Mining Records.

CORNWALL.

Mines.	Lead Ore Returns.	Lead Retns.
Callington	Tons 957	632
Huel Mary Ann	334	250
Huel Trelawny	413	298
Huel Trehane	422	279
Herodsfoot	721	570
East Huel Rose	5,333	3,191
North Huel Rose	80	49
Cargol	964	577
Oxnams	470	288
Huel Rose	399	239
Cubert	68	41
Holmbush	154	90
Callestock	179	110

DEVONSHIRE.

Tamar	1,022	631
Huel Adams	56	30
East Tamar Consols	237	173
Huel Friendship	9	5
Huel Betsey	6	3
Lydford Consols	4	2

CUMBERLAND AND ALSTON MOOR.

Rampgill	424	282
Scaleburn	238	156
Carrs and Hanging Shaw	146	97
Capel Cleugh	139	92
Small Cleugh	31	21
Middle Cleugh	30	20
Guddamgill	50	33
Long Cleugh	1,664	1,142
Browngill	603	400
Bentyfields Veins	35	21
Cowperdyke Heads	14	9
Brigalburn Veins	244	162
Brownley Hill Veins	227	143
Bentfield Sun.V.E.Eng.	119	80
Blagill Veins	76	51
Carrs West of Nent Vein	39	26
Grass Fields Veins	31	20
Galligill Syke Veins	176	117
Galligill Burn	24	16
Hudgill Burn	188	120
Holyfields Veins	58	38
Wellgill Cross Vein	98	66
Rodderrup Cleugh West End	1,470	980
Tyne Bottom Veins	80	54
Park Grove Sun Vein	21	14
Low Birchy Bank	19	12
Dowkeburn West End	95	63
Sundry mines und. 10 tons	44	29

CUMBERLAND AND ALSTON MOOR—*continued.*

Mines.	Lead Ore Returns.	Lead Retns.
Driggith Beck Waste	30	15
Dry Mill Mine	40	27
Greensides	1,560	1,200
Woodend	36	24
Force Cragg	43	32
Keswick Mine	20	14
Slaty Syke	47	35
Calvert	11	6
Dozey	13	9
Slow Craig	25	16
Crossfell Mines	44	30
Sundry, under 10 tons	20	12

DURHAM AND NORTHUMBERLAND.

E. and W. Allendale and Weardale	13,230	9,080
Teesdale Mines	3,327	2,490
Yarnberry	100	75
Silver Tongue	139	95
Derwent Mines	1,480	1,046
Stanhope Burn	220	160
Holly-well	67	48
Lane Head	24	17
Aller Gill	12	8
Bollihope	13	9
Fallow-field	61	45
Whitfield	142	105

WESTMORELAND.

Dufton and Silverband	246	184
Hilton and Marton	273	204

DERBYSHIRE.

Sundry Mines	5,185	3,370

SHROPSHIRE.

Snailbeach	3,463	2,436
White Grit and Batholes	506	239
Bog Mine	139	72
Pennerley	22	15

SOMERSETSHIRE.

Mendip Hills	41	29

YORKSHIRE.

Swale Dale & Arkendale	4,053	3,040
Cononley	699	437
Grassington & Garnbury	1,159	707
Pateley District	937	609

CARDIGANSHIRE.

Mines.	Lead Ore Returns.	Lead Retns.
Lisburne Mines	2,454	1,624
Cwm-ystwyth	120	71
Esgair-hir	116	70
Cwm-sebon	31	17
Llanfair	80	53
Goginan	1,238	816
Gogerddan Mines	243	162
Nant-y-creiau	17	10
Pen-y-bont-pren	38	22
Cefn-cwm-brwyno	36	24
Llwyn-malys	51	33
Bwlch-cwm-erfin	40	26
Bwlch Consols	289	192
Nanteos	50	30
Aberystwith, small mines	20	10
Llanymaron	11	5
Llanbadarn	33	18
Bron-berllan	15	7

CARNARVONSHIRE.

Penrhyn-du	21	14

CARMARTHENSHIRE.

Nant-y-Mwyn	307	204

FLINTSHIRE.

Talargoch	1,500	980
Fronfownog	1,695	1,168
Hendre	1,040	838
Maes-y-safn	1,138	824
Pen-y-rhenblas	1,160	819
Mold Mines	219	153
Long Rake	39	21
Milwr	117	81
Dingle and Deep Level	887	643
Pary's Mine	21	15
Trelogan	15	10
Westminster Mines	659	451
Halkin Hall	39	26
Garreg-y-boeth	6	4
Bodelwyddan	106	69
Belgrave	375	261
Bryng-gwyrog	11	7
Jamaica	835	599
Bwlch-y-ddaufryn	20	16
Gwern-y-mynydd	18	13
Mostyn	13	8
Bagillt (ore sold at)	46	20
Billings	45	20
Caelanycraig	14	7

FLINTSHIRE—*continued.*

Mines.	Lead Ore Returns.	Lead Retns.
Mostyn	12	5
Clwtmilitia	26	11

MONTGOMERYSHIRE.

Llangynnog	51	31
Cae-conroy	33	20
Rhos-wydol	26	15
Dwn-gwm, or Dyfagwm	13	9
Craig-Rhiwarth	27	16
Bryndail and Pen-y-clyn	155	100
Gorn	43	30
Machynlleth, including Delife	545	300
Nantmelyn	19	13
Frontballan	15	7

MERIONETHSHIRE.

Cowarch	74	42
Tyddynglwadus	18	12

IRELAND.

Newtonards	616	366
Conlig	314	179
Shallee	340	202
Glenmalure	45	39
Luganure	422	295
Barristown	175	116

SCOTLAND.

Woodhead	450	320
Afton Lead Mines	80	56
Stroniton Mines	236	141
Cairnsmore	476	311
Black Craig	86	58
Lead Hills Mine	300	200
Wanlock Head	960	650

ISLE OF MAN.

FoxdaleMines,including Peel's shipment, &c.	1,566	1,034
Laxey	695	461
Douglas	260	170

TABLE showing the Total Quantity of LEAD ORE RAISED and LEAD SMELTED in the United Kingdom in 1848.

	Lead Ore.		Lead.	
Cornwall	Tons 10,494		Tons 6,614	
Devonshire	1,334		844	
Cumberland	8,272		5,684	
Durham and Northumberland	18,815		14,658	
Westmoreland	519		388	
Derbyshire	5,185		3,370	
Shropshire	4,130		2,762	
Somersetshire	41		29	
Yorkshire	6,848		4,793	
		55,638		39,142
WALES.				
Cardiganshire	4,902		3,180	
Carnarvonshire	21		14	
Carmarthenshire	307		204	
Flintshire	10,056		7,069	
Montgomeryshire	927		601	
Merionethshire	92		54	
		16,305		11,122
IRELAND		1,912		1,188
SCOTLAND		2,588		1,736
ISLE OF MAN		2,521		1,665
Making a Total of		Tons 78,964		54,853

LEAD ORE and LEAD IMPORTED and EXPORTED during 1848.

IMPORTED.—1,298 tons lead ore; pig and sheet-lead, 3,788 tons; retained for home consumption, 2,157 tons.

EXPORTED.—135 tons lead ore; pig and rolled lead, 4,977 tons; shot, 1,151 tons; litharge, red and white lead, 2,292 tons; foreign lead, in sheet and pig, 3,747 tons.

The WELSH SALES include also the following lead ores:—Australian 69 tons; Belgian, 85 tons; German, 44 tons; Portugal, 79 tons; Prussian, 112 tons; Sardinian, 112 tons.

The total amount of lead ore raised and sold in the United Kingdom for the year 1848 was 78,964 tons, and metallic lead sold 54,853 tons; while in 1847, the amount of lead ore 79,311 tons, and lead 53,410 tons — showing a decrease in the quantity of ore in 1848, as compared with a former year, of 347 tons, but an increase in the metal of 1,443 tons.

The price of English pig at the close of 1847 was £17. 10s. per ton, and at the same period of 1848, £15. 15s. per ton. A comparison of the two years thus shows no very great fluctuation in home trade; but, on referring to the imports and exports, we find a great increase in the latter year. The imports of lead ore in 1847 were 507 tons, and pig and sheet lead 394 tons, and the exports 86 tons of ore, and 3,435 tons of metal; while in 1848 the imports were 1,298 tons of ore, and 3,788 tons of metal; and the exports 135 tons of ore, and 6,128 tons of metal—showing an increase in the imports of 791 tons of ore, and 3,394 tons of metal; and in the exports of 49 tons of ore, and 2,693 tons of pig, sheet lead, and shot, and exclusive of manufactured metal in the shape of litharge and red and white lead.—[*Editor.*]

PUBLIC SALES of TIN MINES in the Counties of CORNWALL

31st December, 1849.

Name of Mines.	First Quarter.							Second Quarter.						
	Quantity of Ore.				Amount of Money.			Quantity of Ore.				Amount of Money.		
	T.	c.	q.	lb.	£.	s.	d.	T.	c.	q.	lb.	£.	s.	d.
Great Polgooth	164	10	0	0	7,837	1	0	186	0	0	0	8,327	1	9
Polberrow	59	0	0	0	2,900	19	3	95	5	0	0	3,103	6	2
Charlestown	73	5	0	0	3,457	8	8	23	10	0	0	1,050	13	9
Wheal Essex	83	0	0	0	4,280	7	6	....				....		
Tincroft	...				....			....				....		
Lewis	15	15	2	18	850	4	4	....				....		
Drake Walls	37	10	0	0	1,734	6	3	25	15	0	0	1,050	19	4
West Wheal Jewel	17	10	0	0	889	1	3	28	5	0	0	1,218	9	5
Wheal Anderton	19	5	0	0	933	12	6	10	0	0	0	481	2	6
East Crowndale	2	0	0	0	....			27	0	0	0	1,137	10	0
Ashburton United	14	2	1	8	723	1	7	9	10	2	12	401	10	0
Budwick Consols	28	0	0	0	1,453	2	5	....				....		
Runnaford Combe	3	10	0	0	199	18	9	5	10	0	0	263	4	3
Wheal Friendship	20	16	0	0	824	10	0	....				....		
West Wheal Providence ..	7	19	1	9	421	18	2	....				....		
South Friendship	....				....			3	0	0	0	113	5	0
Kingston Downs	....				....			....				....		
Beam Mine	....				....			....				....		
Brick Tor	....				....			....				....		
Wheal Anne	....				....			....				....		
Wheal Bal	....				....			1	18	1	4	89	5	2
Mineral Court	....				....			....				....		
	554	3	1	7	27,055	11	8	415	13	3	16	17,245	8	4

COMPANIES BY WHOM

	First Quarter.							Second Quarter.						
	Quantity of Ore.				Amount of Money.			Quantity of Ore.				Amount of Money.		
	T.	c.	q.	lb.	£	s.	d.	T.	c.	q.	lb.	£.	s.	d.
Calenick Smelting Company	178	6	0	0	8,793	17	2½	100	0	0	0	4,205	6	3
Williams & Co.	125	0	0	0	6,449	19	5	83	1	2	18	3,610	8	11
Daubuz & Co.	75	5	0	0	3,645	19	8½	95	7	2	0	3,897	6	8
H. J. Enthoven & Co. ..	102	17	1	8	5,073	7	2	86	12	3	26	3,480	7	3
Bissoe Company	39	0	0	0	1,822	5	8	50	11	2	18	2,051	19	3
Various	15	15	2	18	850	4	4	....				....		
Union Smelting Company..	....				....			....				....		
Treloweth Company ..	7	19	1	9	421	18	2	....				....		
	544	3	1	7	27,005	11	8	415	13	3	16	17,245	8	4

The whole produce of Tin Mines in the Counties of Cornwall and Devon must not
sales, to which we have access of information, while the greater portion is disposed of
impracticable to obtain any accurate returns, and hence the imperfect table herewith

and DEVON, reported in the Official Returns for the year ending

Third Quarter.		Fourth Quarter.		Total.	
Quantity of Ore.	Amount of Money.	Quantity of Ore.	Amount of Money.	Quantity of Ore.	Amount of Money.
T. c. q. lb.	£. s. d.	T. c. q. lb.	£. s. d.	T. c. q. lb.	£. s. d.
170 0 0 0	6,819 2 6	180 0 0 0	7,464 5 0	700 10 0 0	30,477 11 3
79 10 0 0	3,097 3 9	71 10 0 0	2,831 7 6	295 5 0 0	11,932 16 8
11 0 0 0	440 17 6	10 0 0 0	406 1 10	117 15 0 0	5,355 1 9
....	....	....	....	83 0 0 0	4,280 7 6
67 18 3 20	2,559 13 11	30 9 0 16	1,338 18 2	98 8 0 8	3,898 12 1
44 19 2 10	1,955 6 1	28 0 0 7	1,041 0 2	88 15 1 7	3,846 10 7
....	....	22 17 1 16	932 11 0	86 2 1 16	3,717 16 7
14 0 0 0	558 5 0	14 0 0 0	585 5 0	73 15 0 0	3,261 0 8
10 0 0 0	428 4 4	9 0 0 0	399 2 6	48 5 0 0	2,242 1 10
7 0 0 0	308 0 0	3 0 0 0	123 7 6	37 0 0 0	1,568 17 6
3 15 1 14	146 19 5	4 10 3 2	182 13 3	31 19 0 8	1,463 4 3
....	....	....	....	28 0 0 0	1,453 2 5
9 10 0 0	390 5 0	4 0 0 0	188 0 0	22 10 0 0	1,041 8 0
....	....	2 0 0 0	69 0 0	22 16 0 0	893 10 0
....	....	....	....	7 19 1 9	421 18 2
2 3 0 0	79 2 6	4 15 0 0	196 5 7	9 18 0 0	388 13 1
4 0 0 0	117 0 0	4 3 0 0	132 8 6	8 3 0 0	249 8 6
....	....	4 4 3 24	214 12 0	4 4 3 24	214 12 0
....	....	4 10 0 0	209 4 0	4 10 0 0	209 4 0
2 10 0 0	96 11 3	....	....	2 10 0 0	96 11 3
....	....	....	....	1 18 1 4	89 5 2
1 9 0 27	68 10 6	....	....	1 9 0 27	68 10 6
427 16 0 15	17,065 1 9	406 10 1 9	16,314 2 0	1,794 3 2 19	77,6

THE ORES WERE PURCHASED.

Third Quarter.		Fourth Quarter.		Total.	
Quantity of Ore.	Amount of Money.	Quantity of Ore.	Amount of Money.	Quantity of Ore.	Amount of Money.
T. c. q. lb.	£. s. d.	T. c. q. lb.	£. s. d.	T. c. q. lb.	£. s. d.
70 18 2 19	2,819 10 6	70 14 2 19	2,907 18 2	319 19 1 10	18,726 12 1½
70 12 2 18	2,817 11 1	75 6 2 19	3,055 13 11	354 0 3 27	15,933 13 4
64 16 1 3	2,574 13 11	74 16 2 14	3,164 0 7	310 5 1 17	13,282 0 10½
48 13 3 18	1,949 9 5	46 1 3 21	1,872 4 3	287 6 0 7	12,375 8 1
56 0 3 9	2,241 17 5	53 2 2 20	2,163 13 2	198 14 3 27	8,279 15 6
3 15 0 14	146 19 5	74 19 3 25	2,685 19 0	94 10 3 1	3,683 2 9
112 18 2 18	4,515 0 0	11 7 3 23	464 12 11	124 6 2 13	4,979 12 12
....	....	....	....	7 19 1 9	421 18 2
427 16 0 15	17,065 1 9	406 10 1 9	16,314 2 0	1,794 3 2 19	77,680 3 9

be estimated by the above returns, inasmuch that such only relate to the public by private contract. Since the repeal of the coinage duty in 1838, it has been found presented.

CORNISH COPPER ORES.

Annual average Produce, Price, and Standard for nine years, from 1841 to 1849, inclusive, of Copper Ores sold at Cornish ticketing, with the highest and lowest prices of Cake Copper in each year.

Year.	Standard.			Produce.	Price.			Cake Copper—per Ton.				
	£.	s.	d.		£.	s.	d.	£.		£.	s.	d.
1841	125	1	0	7¼	6	5	0	100	to	95	0	0
1842	112	18	0	7⅜	5	12	1	96	to	83	0	0
1843	109	8	0	7½	5	10	0	88	to	78	10	0
1844	107	8	0	7⅜	5	4	9	88	to	88	3	0
1845	106	2	0	7⅞	5	13	0	93	to	84	0	0
1846	102	2	0	7⅞	5	5	10	93	to	88	10	0
1847	103	11	0	8¼	5	14	1	98	to	93	0	0
1848	90	13	0	8 5/16	4	18	9	93	to	87	0	0
1849	99	18	3	8	5	4	3	86	to	79	10	0

DECLARED VALUE of EXPORTS of BRITISH & IRISH METALS for the Years ending 5th Jan. 1847, 1848, 1849, and 1850.

	1847.	1848.	1849.	1850.
	£.	£.	£.	£.
Iron and steel ..	4,178,026	5,265,779	4,747,009	4,966,973
Copper and brass ..	1,558,187	1,541,868	1,272,675	1,204,301
Lead	147,170	179,344	117,181	287,337
Tin unwrought ..	107,456	159,466	143,436	141,577
Tin plates	639,223	462,889	530,061	711,649

EXPORTS of ENGLISH and IRISH METALS and MINERALS.

The following particulars are extracted from an account of the exports of the principal articles of British and Irish produce and manufactures in the twelve months ending on the 5th January, 1846, 1847, 1848, 1849, and 1850.

	1846.	1847.	1848.	1849.	1850.
	£.	£.	£.	£.	£.
Coals, culm ..	973,635	971,174	976,377	1,088,221	1,088,148
Earthenware ..	828,182	793,166	834,151	722,012	807,466
Glass	357,421	262,547	292,038	237,573	277,175
Hardware, cutlery	2,183,000	2,180,587	2,346,255	1,860,150	2,198,597
Machinery ..	904,961	1,117,470	1,228,091	234,132	154,707
Iron, steel ..	3,501,895	4,178,026	5,272,942	4,777,965	4,947,643
Copper, brass ..	1,694,441	1,558,187	1,467,498	1,257,945	1,863,287
Lead	210,974	147,170	181,771	115,547	287,337
Tin, unwrought..	48,777	107,456	159,098	143,085	141,577
Tin plates ..	615,729	639,223	459,265	532,142	711,649
Salt	218,302	205,005	260,591	266,480	254,126

The total amount of exports shows—in 1846, £53,298,026; in 1847, £51,227,060; in 1848, £50,897,790; in 1849, £48,946,325; and in 1850, £58,848,042.

EXPORTS of METALS to ALL INDIA from LONDON and LIVERPOOL, for the Years 1847, 1848, and 1849.

		1847.	1848.	1849.	In. in 1849.
Spelter	*Tons*	3,244	3,019	4,041	1,022
Copper		3,553	3,652	6,153	2,501
Iron, British		10,976	20,617	37,448	16,831
Ditto, foreign		847	339	2,320	1,981
Tin plates	*Boxes*	7,308	4,024	14,832	10,808
Lead	*Tons*	1,099	926	3,230	2,304
Steel		552	295	990	695
Quicksilver	*Bottles*	50	45	407	362

IMPORTS of SPECIE.

A return made up for the year ending the 31st December last, of the importation of specie and bullion into the port of Southampton by the mail steamers, shows that the receipts have amounted to no less a sum than $33,943,275, or £6,788,655 sterling. The subjoined table shows the receipts:—

Gold and Silver Coin and Bullion—Imports for the Year ending Dec. 31, 1849.

From Mexico, Central America, Chili, Peru, Bolivia, New Granada, California, &c..	£4,648,270
From Alexandria	728,851
From Constantinople	933,510
From Spain and Portugal	310,000
From other parts	168,025
Total	£6,788,656

COAL and LEAD IMPORTS of the UNITED STATES.

Lead.—The import of foreign lead into the United States from February 28, 1849, to December 28, 1849, was :—From Liverpool, London, &c., 89,962 pigs; from France, 19,591; from Spain, 65,316; from Holland and Belgium, 3,965; from Austria, 4,100—total, 182,934 pigs, or 12,195 tons, at 15 pigs to the ton, or equal to 365,868 American pigs. Of the above, New York has received 152,803 pigs, or 10,180 tons.

Coal.—The amount and value of coal imported into the United States during the year ending the 30th June, 1849, was:—From England, 63,079 tons, value $156,154; from Scotland, 1,469 tons, value $2,721; from Ireland, 600 tons, value $1,437; British American colonies, 131,565 tons, value $245,693; and from other places, 1,500 tons, value $3,277—total, 198,213 tons, of the value of $409,282.

The following table shows the imports of foreign coal into the United States annually, from 1821 to the 1st July, 1849. The duty on foreign coal under the present tariff is 30 c. to 45 c. per ton on board:—

1821	22,122	1836	108,432
1822	34,523	1837	153,450
1823	30,433	1838	129,083
1824	7,228	1839	181,551
1825	25,645	1840	162,867
1826	35,665	1841	155,394
1827	40,257	1842	141,526
1828	32,302	1843	41,163
1829	45,393	1844	87,073
1830	58,136	1845	85,771
1831	36,508	1846*	156,855
1832	72,978	1847†	148,021
1833	92,432	1848	196,251
1834	71,626	1849	198,213
1835	49,969		

* From Dec. 1, 1846, to June 30, 1847. † For the year ending June 30, 1848.

COPPER-SMELTING ESTABLISHMENTS.

	1. Mines Royal Company.	2. Vivian and Sons.	3. Freeman and Company.	4. Pascoe Grenfell and Sons.
Cashier ..	J. W. Bevan	Oct. Williams	H. M. Grylls	Alfred Jenkin
Assayer ..	J. W. Bevan	Steph. Williams	S. Michell	S. Mitchell
Sample-taker	Alex. Vivian	Henry Williams	R. Hichens	James Angrove
Clerk.. ..	Charles Bone	John Hernaman	W. M. Grylls	Silvanus Jenkins

	5. Williams's Crown Copper Co.	6. Sims, Willyams, and Company.	7. Williams, Foster, and Company.	8. John Schneider and Company.
Cashier ..	W. Williams	H. Willyams	M. Williams	John Penrose
Assayer ..	W. Andrew	J. Christoe	J. Andrew	John Penrose
Sample-taker	A. Pryor	W.H.Tregoning	A. Pryor	E. Angove
Clerk.. ..	A. Skewes	R. Christoe	A. Skewes	R. Sampson

TIN-SMELTING ESTABLISHMENTS.

Name of Works.	Proprietors.	Name of Works.	Proprietors.
Calenick	Michell & Co.	Trethellan, Millineur	Williams, Harvey, & Co.
Carodras, Treloweth	Daubuz & Co.	Tamar	Union Company
Charlestown House..	Enthoven & Sons	Brisol	Tregoning & Co.
Angarrack, Chyandour	Bolithos & Co.		

FLUCTUATIONS in the STOCK and SHARE MARKET, during the Year 1849.

Stocks and Shares.	Jan. 1, 1849.	Highest.	Lowest.	Jan. 1, 1850.
Consols	$88\frac{3}{4}$ ex div.	$96\frac{7}{8}$ ex div.	$88\frac{5}{8}$	$96\frac{1}{2}$
Exchequer Bills	42*s*. pm.	61*s*. pm.	35*s*. pm.	60*s*. pm.
Railways:—				
Brighton	$64\frac{1}{2}$	$82\frac{3}{4}$	63	79
Birmingham and Oxford ..	$25\frac{1}{2}$	$26\frac{1}{4}$	24	26
Caledonian	$22\frac{1}{4}$	27	10	$10\frac{3}{4}$
Eastern Counties	$11\frac{7}{8}$	$12\frac{1}{4}$	$6\frac{5}{8}$	$6\frac{7}{8}$
Great Western	91	$105\frac{3}{4}$	48	58
London and North-Western ..	126	143	$104\frac{3}{4}$	111
Midland	87	$99\frac{1}{2}$	$42\frac{1}{4}$	45
North Staffordshire	$13\frac{1}{2}$	$17\frac{1}{4}$	$7\frac{1}{2}$	$7\frac{1}{2}$
South-Eastern	24	$26\frac{1}{2}$	$16\frac{1}{4}$	$18\frac{3}{4}$
South-Western	84	89	55	$60\frac{1}{2}$
York and North Midland ..	55	$59\frac{1}{2}$	$16\frac{1}{2}$	18
Boulogne and Amiens	$8\frac{1}{4}$	$10\frac{1}{8}$	5	$7\frac{3}{8}$
Northern of France	$10\frac{1}{2}$	$14\frac{1}{8}$	$9\frac{1}{4}$	$12\frac{1}{2}$

THE METAL TRADE.

Prices of the following on the 31st December of each year.

	1842.	1843.	1844.	1845.
Spelter ....*per ton*	£27 10 to £28 0	£22 5 to £22 10	£22 12 6 to £22 15	£20 10 0 to £21 0
English Bar Iron..............	5 15 to 5 10	5 0 —	6 15 0 —	9 15 0 —
Pig Iron, in Wales	3 15 —	3 5 —	4 0 0 —	5 0 0 to 5 15
,, at Glasgow	2 7 6 to 2 10	2 3 —	3 2 6 —	4 2 6 to 4 5
Swedes Iron	11 10 0 to 12 0	10 10 —	10 0 0 —	11 10 0 to 12 0
Swedish Keg Steel	£18	17 10 —	16 0 0 —	15 0 0 —
Copper, Eng. Sheathing..*per lb.*	9½*d.*	9¾*d.*	9½*d.*	10½*d.*
,, ,, Cake......*per ton*	£84	£86	£84	£93
Tin, English Block ....*per cwt.*	£63 to £65	70*s.*	71*s.*	103*s.*
,, Foreign Banca	67*s.* 6*d.*	70*s.* to 72*s.*	65	92
Straits............	60*s.* to 61*s.*	70*s.*	63	91
Tin Plates, IC...........*per box*	26 to 29	23*s.* 6*d.* to 27*s.*	25*s.* to 31*s.*	29*s.* to 33*s.*
Lead, English Pig ......*per ton*	£17 5 to £17 10	£17 10	£16 15 —	£19 10
,, Spanish	17 5 —	16 10	16 0 to £16 10	18 10

	1846.	1847.	1848.	1849.
Spelter ....*per ton*	£19 12 6 to £19 15	£19 10 to £20 0	£15 0 0 —	£16 10
English Bar Iron..............	10 0 0 —	8 5 to 8 10	6 0 0 to £6 5	6 0
Pig Iron, in Wales	4 5 0 to 5 5	3 5 to 4 10	3 15 0 to 4 5	£3 5 to £3 10
,, at Glasgow	3 17 6 to 4 0	2 5 to 2 8	2 7 6 to 2 8	£2 9
Swedes Iron	11 10 0 —	11 5 —	11 0 0 to 12 0	11 10
Swedish Keg Steel	15 0 0 to 15 10	14 0 —	13 10 0 to 14 0	15 0
Copper, Eng. Sheathing..*per lb.*	10*d.*	11*d.*	9*d.*	9½*d.*
,, ,, Cake......*per ton*	£88 10	£98	£79 10	£84
Tin, English Block ....*per cwt.*	98*s.*	82*s.*	78½*s.*	80*s.*
,, Foreign Banca	102	84	86	80
Straits............	98	80	82	77
Tin Plates, IC...........*per box*	27*s.* to 33*s.*	23*s.* to 30*s.*	26*s.* to 30*s.*	28*s.* to 37*s.*
Lead, English Pig ......*per ton*	£18 10	£17 15 —	£16 0 to £16 5	£16 5 to £16 10
,, Spanish	17 10	17 0 to £17 5	14 15 to 15 10	15 0 to 15 10

PRODUCE of MINES in CORNWALL and DEVON for 1849.

No. 1. MINES.	QUARTER ENDING																TOTALS.			
	March 31.				June 30.				September 30.				December 31.							
	Tons.	£.	s.	d.	Tons.	£.	s.	d.	Tons.	£.	s.	d.	Tons.	£.	s.	d	Tons.	£.	s.	d.
Devon Great Consols	4,509	25,551	10	6	3,923	23,449	0	6	3,546	22,873	18	6	3,799	25,060	3	6	15,777	96,934	13	0
Carn Brea	2,440	16,145	3	6	2,560	15,574	0	0	2,631	17,297	8	0	2,455	17,625	15	0	10,086	66,642	6	6
Par Consols	1,881	11,541	0	6	1,989	11,079	1	6	1,898	10,334	16	6	1,604	10,147	11	6	7,372	43,102	10	0
Great Consolidated	2,604	12,909	1	0	1,235	6,125	2	0	2,732	15,362	9	6	1,335	7,466	8	6	7,906	41,863	1	0
Great United	2,837	11,738	15	6	3,304	12,376	3	0	2,835	10,535	14	6	3,252	12,598	8	0	12.228	47,249	1	0
Fowey Consols	1,579	8,952	12	0	1,760	10,066	18	6	1,444	8,043	4	6	1,483	9,379	5	0	6,266	36,442	0	0
West Caradon	1,003	7,433	19	6	1,052	8,089	18	6	961	7,061	18	0	950	7,288	3	6	3,966	29.872	10	6
North Pool	1,672	7,073	8	6	1,790	8,185	4	0	1,441	5,858	0	6	1,584	6.600	8	0	6,487	27,717	1	0
North Roskear	1,890	8,226	18	6	—	—			1,884	8,473	4	6	960	5,171	1	6	4,734	21,871	4	6
Wheal Seton	948	4,305	0	6	1,188	5,311	13	0	1,163	5,072	13	6	1,654	6,886	18	0	1,953	21,576	5	0
South Wheal Basset	518	4,036	1	6	855	5,715	12	0	525	3,780	6	0	1,118	7,321	4	6	3,016	20,853	8	6
Wheal Prosper and Friendship	701	5,404	16	0	647	4,771	0	0	616	4,847	13	0	552	4,106	4	0	2,516	19.183	13	0
Tywamhale and Nancekuke ..	950	4,350	5	6	1,228	5,137	2	6	1,367	5,016	0	6	1,219	4,214	6	6	4,764	18,717	15	0
South Wheal Francis	396	4,105	8	0	493	4,451	18	6	536	5,131	0	6	419	3,860	9	6	1,844	17,448	16	6
Tincroft	104	3,417	11	6	1,048	4,202	15	6	1,538	4,791	18	0	1,355	4,639	9	6	4,045	17,051	14	6
Trevisky and Barrier	838	5,710	2	6	459	2,393	5	6	703	4,544	13	0	421	3,201	9	0	2,421	15,849	10	6
South Caradon	737	517	7	6	772	5,172	6	0	—	—			708	4,993	19	0	2,217	15,337	12	6
East Wheal Crofty	646	3,056	13	6	955	4,429	16	0	601	2,358	9	0	1,015	4,696	15	0	3,217	14,541	13	6
Stray Park, Camborne, Vean, and Wheal Francis	435	1,635	17	6	901	3,811	13	0	424	1,694	0	6	1,015	4,354	4	0	2,775	11,495	15	0
Tresavean	903	3,627	12	6	817	2,610	12	6	912	3,092	11	0	702	2,153	5	0	3,334	11,484	1	0
Levant	441	2,369	5	6	255	1,564	7	6	658	4,273	0	0	550	2,766	6	0	1,904	10,972	13	6
Bedford United	343	1,968	0	0	343	2,342	15	6	368	2,875	1	6	361	2,968	9	6	1,415	10,154	6	6
West Wheal Buller	102	929	17	0	352	2,637	4	6	289	2,433	7	6	442	2,967	12	6	1,165	8,968	2	0
South Roskear and Wheal Pance	429	1,679	12	6	1,095	5,553	19	6	231	982	16	6	84	259	4	0	1,839	8,475	12	6
Condurrow	221	889	8	0	556	2,696	17	6	247	1,180	1	0	469	2,881	8	6	1,493	7,647	15	0
Wheal Mary	265	1,291	11	6	348	1,845	6	6	232	942	9	6	497	2,377	2	0	1,342	7,456	9	6
Wheal Comfort	582	1,822	2	6	764	1,527	0	0	776	1,888	9	0	962	2,166	8	6	3,084	7,404	0	0

PRODUCE of MINES in CORNWALL and DEVON for 1849—*continued.*

No. 2. MINES—*continued.*	March 31. Tons.	£.	s.	d.	June 30. Tons.	£.	s.	d.	September 30. Tons.	£.	s.	d.	December 31. Tons.	£.	s.	d.	TOTALS. Tons.	£.	s.	d.
West Wheal Treasury	382	1,701	18	0	320	1,678	10	6	371	1,959	0	6	289	1,577	18	0	1,362	6,897	7	0
Treleigh Consols	329	1,993	14	0	282	1,979	17	6	298	1,542	18	6	345	1,356	9	6	1,254	6,872	19	6
Wheal Agar	418	1,435	4	6	379	1,218	7	6	394	1,658	13	0	312	1,582	12	0	1,503	5,894	17	0
South Tolgus	250	1,387	15	0	121	623	16	6	344	1,859	6	0	247	1,800	10	6	962	5,671	8	0
Dolcooth	158	656	6	6	333	1,575	17	6	176	774	12	6	361	2,193	16	6	1,028	5,200	13	0
Perran St. George	221	1,288	16	0	135	785	8	0	304	2,375	1	6	168	747	10	6	828	5,196	16	0
Wheal Tremayne	329	1,068	0	6	397	1,172	17	6	518	1,564	10	0	402	1,225	0	0	1,646	5,030	8	0
Wellington	90	651	2	6	220	1,387	4	0	118	711	13	6	244	1,503	11	6	672	4,253	11	6
Marke Valley	150	407	3	0	491	1,509	6	0	246	828	2	0	472	1,438	5	6	1,359	4,182	16	6
East Pool	185	648	17	6	415	1,394	6	6	156	454	10	0	380	1,641	16	0	1,136	4,139	10	0
West Wheal Seton	112	601	17	6	253	1,463	3	0	140	773	10	0	234	1,142	14	0	739	3,981	3	0
Poldice	240	1,022	10	6	111	491	5	6	303	1,513	1	6	137	672	18	6	791	3,699	16	0
Creegbraws	237	886	18	0	238	1,158	14	6	238	1,196	5	0	54	129	10	0	767	3,371	7	6
Trethellan	355	991	4	0	246	445	4	0	454	1,145	17	6	232	550	2	6	1,287	3,132	8	0
West Fowey Consols	93	703	3	0	80	376	0	0	100	645	0	0	186	1,087	6	0	459	2,911	9	0
Holmbush	50	266	5	0	167	917	15	6	76	412	6	0	161	760	6	6	454	2,356	13	0
Wheal Ellen	161	1,058	7	6	81	379	8	6	120	608	9	0	41	238	9	0	403	2,284	14	0
Wheal Mary Consols	227	1,170	18	0	123	479	12	6	161	627	14	6	—	—			511	2,296	5	0
Wheal Henry	—	—			—	—			240	1,401	6	6	98	454	8	0	338	1,855	9	6
Grambler and St. Aubyn	151	686	3	6	53	213	6	6	140	728	10	6	54	119	15	0	398	1,827	15	6
Charlestown United	72	599	8	0	70	422	15	0	113	797	19	0	—	—			255	1,820	2	0
West Wheal Jewel	66	221	8	0	154	538	15	0	53	210	13	6	127	601	7	0	400	1,617	3	6
Wheal Pink	55	268	2	6	130	639	5	0	54	201	3	0	115	453	19	6	354	1,562	10	0
South Wheal Fortune	31	172	10	6	49	545	7	0	22	170	10	0	93	513	15	0	195	1,402	2	6
Wheal Basset	—	—			—	—			172	1,264	1	0	—	—			172	1,264	1	0
Phœnix Mines	22	236	10	0	38	238	7	6	30	169	12	0	58	317	11	0	150	962	0	6
West Trethellan	34	105	8	0	58	181	8	0	40	157	0	0	107	382	6	6	239	826	2	6
Wheal Vyvian	36	189	18	0	36	179	2	0	116	343	14	0	49	175	0	0	237	887	14	0

PRODUCE of MINES in CORNWALL and DEVON for 1849—*continued.*

No. 3. MINES—*continued.*	QUARTER ENDING																TOTALS.			
	March 31.				June 30.				September 31.				December 31.							
	Tons.	£.	s.	d.	Tons.	£.	s.	d.	Tons.	£.	s.	d.	Tons.	£.	s.	d.	Tons.	£.	s.	d.
South Crinnis	101	512	7	6	—		—		—		—		55	275	0	0	156	787	17	6
Wheal Maiden	41	172	18	6	24	93	0	0	76	327	1	0	30	149	5	0	171	742	4	6
Alfred Consols	128	349	19	0	38	68	8	0	30	79	8	0	60	189	14	0	256	687	9	0
Great Work	—		—		95	650	0	0	—		—		—		—		95	650	0	0
Wheal Bucketts	119	425	4	6	70	205	10	0	—		—		—		—		189	630	14	6
Wheal Busy	59	185	14	6	54	129	15	0	58	160	11	0	37	103	12	0	208	579	12	6
Wheal Penhale	—		—		—		—		45	273	7	6	51	296	9	0	96	569	17	0
Wheal Jewel	28	108	3	0	18	82	9	0	43	187	6	6	11	58	15	6	100	436	14	0
Wheal Providence	72	193	17	6	60	151	10	0	—		—		32	78	8	0	164	423	15	6
Polberrow	—		—		—		—		—		—		—		—		35	416	10	0
Gonamena	—		—		—		—		—		—		—		—		60	339	0	0
South Wheal Fortune	—		—		—		—		—		—		—		—		43	308	1	0
Wheal Bands	—		—		—		—		—		—		—		—		73	251	6	0
Wheal Neptune	—		—		15	117	15	0	8	62	0	0	10	70	5	0	33	250	0	0
Richard's Ore	—		—		—		—		—		—		—		—		119	246	15	0
Wheal Clifford	—		—		—		—		—		—		—		—		79	237	1	0
North Wheal Darlington ..	—		—		—		—		—		—		—		—		38	219	15	0
St. Aubyn and Grylls	—		—		—		—		14	94	10	0	22	123	15	0	36	218	5	0
Hawke's Point	—		—		—		—		—		—		—		—		44	214	2	6
Tamar Slag	—		—		—		—		—		—		—		—		36	207	0	0
St. Ive's Consols	—		—		—		—		—		—		—		—		26	201	12	6
Botallack	—		—		—		—		—		—		—		—		20	177	10	0
Trenance	—		—		—		—		—		—		—		—		16	154	0	0
Carthew Consols	—		—		—		—		—		—		—		—		37	150	17	0
Wheal Tremwith..	—		—		—		—		—		—		—		—		17	144	18	6
Sundry Mines, No. 4 ..																	731	2,506	9	0
Total for 12 months ..																	145,604	761,108	10	0

NOTE.—There will be found a slight variation on comparing the above with other returns, but of no considerable value, such being unavoidable.

The following MINES have also made RETURNS during the past Year. No. 4.

	Tons.	Amount. £.	s.	d.
Andrew and Nangiles	46	143	7	6
Sundry slags and regulus	71	137	10	0
Polgooth	21	137	2	0
Wheal Rodney	89	136	12	6
Wheal Union	15	123	9	6
Wheal Pleasant	23	115	11	6
North Downs	27	109	6	6
Prideaux Wood	35	106	15	0
Wheal Rose	19	104	19	6
Camborne Consols	12	102	18	0
Wheal Prosper	43	99	7	6
Lewis Mines	18	81	0	0
Godolphin	22	72	3	6
Wheal Brewer	30	68	19	6
East Wheal Seton	24	66	12	0
Wheal Providence	9	61	13	0
Wheal Virgin	20	58	19	0
Wheal Harriet	12	56	2	0
Wheal Friendship	3	55	4	0
Wheal Tryphena	6	51	15	0
Colom's Ore	17	48	0	6
East Downs	9	43	17	6
Wheal Speedwell	12	39	12	0
Francis Ore	12	38	2	0
East Crinnis	5	37	8	6
Carried forward	600	2,096	8	0

	Tons.	Amount. £.	s.	d.
Brought forward	600	2,096	8	0
Wheal Kitty	5	30	0	0
Wheal Nancy	4	28	0	0
Wheal Tolgus	10	27	0	0
North Godolphin	10	26	15	0
Unity Wood	5	25	2	6
Gwinnear Consols	12	23	14	0
Wheal Oak	6	21	18	0
North Wheal Abraham	5	21	15	0
West Wheal Mary	6	18	15	0
Wheal Fortune	4	18	12	0
Williams Ore	16	18	5	0
Wheal Caroline	5	17	2	6
Trenoweth	7	16	2	6
Wheal Plenty	3	16	7	0
Mica Bay	3	15	6	6
Wheal Northey	2	15	12	0
Wheal Pembroke	5	13	0	0
Owen Vean	4	12	14	0
Crage's Ores	3	9	12	0
Cassiyes	4	8	16	0
Wheal Neptune	2	8	14	0
Wheal Jane	4	6	0	0
West Wheal Rodney	4	5	18	0
Wheal Brook	2	5	0	0
Total	731	2,506	9	0

LIST of DIVIDENDS PAID in CORNWALL and DEVON MINES,

In TWELVE MONTHS, ending Dec. 31, 1849.

Mines.	Amount.	Div. per Share.			Paid up.	Price.
Devon Great Consols	£34,304	£33	10	0	£ 1	£190
Par Consols	19,200	150	0	0	900	800
East Wheal Rose	17,920	140	0	0	50	625
Carn Brea	15,000	15	0	0	15	110
North Pool	11,750	117	10	0	45	500
South Frances	7,192	58	0	0	160	300
Levant	6,720	42	0	0	—	170
South Basset	6,400	50	0	0	—	450
Tamar Consols	5,760	0	12	0	3	8
Wheal Margaret	4,368	39	0	0	—	210
Great Polgooth	5,504	21	10	0	150	300
Wheal Friendship	3,840	30	0	0	—	—
West Caradon	3,840	15	0	0	20	100
Wheal Trelawney	3,640	14	0	0	7½	85
Treviskey	3,120	26	0	0	130	140
Bedford United	3,000	0	15	0	2¾	4¾
Great Work (Tin)	2,677½	22	10	0	—	—
Trehane	2,688	10	10	0	1	31
West Buller	2,560	20	0	0	10	380
West Providence	2,048	8	0	0	1	30
Tincroft	2,100	0	7	0	7	12
Providence Mines	3,640	32	10	0	—	—
Balleswiddin	2,760	1	14	0	—	—
United Mines	2,000	10	0	0	—	—
Comfort	1,654	13	0	0	—	90
North Roskear	1,120	8	0	0	10	300
Wheal Seton	1,584	8	0	0	75	280
Stray Park	1,000	1	0	0	40	22
Great Consols	960	10	0	0	1,000	220
Wheal Wellington	896	3	10	0	—	—
Condurrow	768	3	0	0	—	90
Boscaswell	800	12	10	0	—	—
Spearne Consols	656	5	2	6	—	—
Wheal Mary Ann	640	1	5	0	—	33
South Caradon	640	5	0	0	5	400
Wheal Tremayne	512	0	10	0	$9\frac{5}{8}$	5½
East Crofty	470	5	0	0	—	65
St. Ives Consols	470	5	0	0	—	—
Wheal Franco	388	1	0	0	—	—

Total Dividend paid on 38 mines, £184,589. 10s.

PAID on WELSH and other MINES, during the same period.

Lisburne...... £6,000 .. £60 per share.
Goginan ...... 4,000 .. 40 ,,

Total.. £10,000

IRISH MINE.

Wicklow Copper .. £2,750 .. 10s. per sh. £5 paid .. £8 price.

FOREIGN MINES.

Cobre Copper	£48,000	0	0
St. John del Rey	29,000	0	0
United Mexican	4,940	5	0
Total	£81,940	5	0

Making a GRAND TOTAL of

Cornwall and Devon	£184,589	10	0
Foreign	81,940	5	0
Welsh	10,000	0	0
Irish	2,750	0	0
Grand Total	£279,280	2	0

Other mines, which are chiefly private speculations, have paid dividends.

The dividends on mines in Cornwall, to the accounts of which we have access, amounted in the year ending—

Dec. 31, 1836 to £158,838 0 on 28 mines.
Dec. 31, 1847 ,, 155,381 0 on 30 mines.
Dec. 31, 1848 ,, 129,024 0 on 22 mines.
Dec. 31, 1849 ,, 181,589 10 on 38 mines.

IMPORTS OF METALS for 1846, 1847, and 1848, from Parliamentary Returns made up to 5th January, 1849.

	Month ending 5th Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Jan.	Total.
	1846.											1847.	
Copper ore ....tons	3,456	4,914	3,992	3,756	2,411	6,226	4,196	5,370	6,703	2,090	4,481	4,029	51,624
— unwrought cwts.	..	55	171	198	55	1,529	60	566	5,367	2	64	1,234	9,331
Iron in bars....tons	233	650	440	1,687	2,015	5,529	2,691	5,544	4,485	2,428	2,733	6,199	34,633
Steel, u. w.....cwts.	160	266	3,367	3,226	304	1,008	2,402	2,094	997	872	1,610	2,160	18,466
Lead, pig, &c...tons	404	430	365	367	374	638	619	866	1,349	727	557	1,166	7,863
Spelter .... ,,	56	94	448	799	906	1,026	206	468	787	371	865	1,220	7,245
Tin in blocks..cwts.	992	705	2,245	1,558	2,658	669	548	4,007	1,415	484	130	4,896	20,306
Quicksilver ....lbs.	169,076	..	..	187,836	571,095	..	..	227,224	190,005	229,009	929	265,399	1,840,583
	1847.											1848.	
Copper ore ....tons	930	2,385	3,499	2,145	4,917	4,962	2,776	3,737	3,301	2,502	3,886	6,452	41,491
— unwrought cwts.	..	2,721	385	..	..	808	364	..	1,073	..	2,731	2,182	10,265
Iron in bars....tons	758	7	221	538	2,040	1,574	6,058	5,533	6,351	3,181	3,044	4,010	33,317
Steel, u. w.....cwts.	953	..	628	..	..	3,848	2,002	2,217	1,068	1,469	478	433	13,097
Lead, pig, &c...tons	6	612	246	74	328	126	112	213	755	443	251	766	3,932
Spelter .... ,,	33	35	251	328	879	2,313	1,344	2,793	1,957	1,487	843	505	12,769
Tin in blocks..cwts.	..	1,455	2,850	512	1,713	1,119	5,032	2,751	904	3,412	..	3,561	23,307
Quicksilver ....lbs.	396,742	76	..	209,912	220,031	181,044	264,096	610,091	..	248,743	402,471	9,651	2,542,857
	1848.											1849.	
Copper ore ....tons	1,524	5,039	5,672	2,876	5,415	5,965	5,182	2,612	5,656	1,687	3,397	..	14,167
Do. 11 & 12 Vict. ..	..	..	..	..	..	..	..	..	..	..	..	5,122	35,981
— unwrought cwts.	..	..	..	226	..	2,607	1,387	4,148	..	573	1,068	245	10,255
Iron in bars....tons	1,070	323	573	716	773	2,784	2,546	2,877	3,771	3,314	2,862	1,787	23,396
Steel, u. w.....cwts.	..	2,307	300	13	..	897	573	206	654	405	79	1,064	6,755
Lead, pig, &c.. tons	..	553	101	33	603	252	550	387	383	225	205	516	3,507
Spelter .... ,,	81	18	408	285	2,427	1,772	1,301	1,262	971	1,106	1,428	2,302	13,423
Tin in blocks..cwts.	..	16	706	336	..	291	..	..	1,310	1,891	929	1,253	6,733
Quicksilver ....lbs.	..	..	139,801	247,561	150,101	..	210,729	462,933	428,514	..	..	58,024	1,562,663

EXPORTS OF METALS for the years 1846, 1847, and 1848, from Parliamentary Returns up to 5th January, 1849.

	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	ec. D	Jan.	Total.
	1846.											1847.	
Copper ore .... tons													
— unwrought cwts.	79	..	143	..	73	153	..	..	1,147	5	2,482	2,190	6,272
Iron in bars .... tons	360	295	534	387	225	514	405	772	90	133	279	99	4,094
Steel, u. w..... cwts.	1,467	442	25 0	2,207	831	1,412	1,820	4,914	1,867	1,640	804	843	18,497
Lead in pigs .. tons	187	283	46 1	563	658	220	625	711	383	141	227	236	4,700
Spelter .... ,,	346	472	5 4 6	1,825	555	580	215	70	29	129	2	15	4,784
Tin in blocks .. cwts.	1,009	1,173	2,832	3,447	1,872	1,557	1,743	2,261	2,045	474	1,622	1,003	21,038
Quicksilver .... lbs.	110,345	35,933	140,376	111,594	171,533	123,521	103,131	131,901	270,195	97,508	150,653	101,381	1,597,519
	1847.											1848.	
Copper unwrght cwt.	460	..	..	377	500	1,032	1,878	177	..	898	5	2,326	8,043
Iron in bars .... tons	251	140	1,049	616	595	462	328	523	184	378	153	374	5,053
Steel, u. w..... cwts.	5,100	226	1,242	606	1,878	841	630	1,490	316	440	246	342	13,357
Lead in pigs.... tons	199	147	269	603	306	247	254	369	415	267	192	193	3,462
Spelter .... ,,	11	2	71	87	280	252	767	357	515	289	341	374	3,346
Tin in blocks .. cwts.	1,382	537	583	646	1,841	632	747	968	1,927	299	1,037	872	11,471
Quicksilver .... lbs.	159,793	92,292	238,026	103,281	149,839	180,204	103,203	143,351	59,268	27,926	151,980	138,857	1,518,164
	1848.											1849.	
Copper ore .... tons													
— unwrought cwts.	250	657	..	..	..	..	..	180	..	318	500	1,820	3,726
Iron in bars .... tons	235	211	220	454	172	247	494	252	499	312	188	149	3,432
Steel, u. w. .. cwts.	247	602	858	..	312	1,120	331	20	1,932	1,530	934	1,893	9,779
Lead in pigs .. tons	60	102	735	535	850	381	108	360	153	373	60	31	3,748
Spelter .... ,,	52	151	166	217	381	821	662	249	531	87	141	318	3,777
Tin in blocks.. cwts.	555	1,024	1,374	839	634	1,382	311	398	1,313	216	147	146	8,341
Quicksilver .... lbs.	273,991	53,869	47,578	149,935	78,003	56,851	56,033	33,699	28,023	26,603	62,946	28,119	895,650

SHARE LIST of BRITISH and FOREIGN MINES.

Shares.	Company.	Paid.	Total Cost.		Price.	Market Value.	
		£.	£.	s.	£.	£.	s.
1,000	Abergwessin	8	8,000	0	8	8,000	0
512	Albert Consols	1	512	0	$2\frac{1}{2}$	1,280	0
1,024	Alfred Consols	$8\frac{3}{8}$	8,576	0	5	5,120	0
1,024	Ashburton United Mines ..	$8\frac{3}{4}$	8,576	0	10	10,240	0
1,624	Balleswidden	9	15,616	0	18	21,232	0
128	Balnoon Consols	25	3,200	0	25	3,200	0
10,000	Banwen Iron Company	6	60,000	0	$6\frac{1}{2}$	65,000	0
1,000	Barristown	$5\frac{1}{4}$	5,750	0	5	1,500	0
4,000	Bedford	2	8,000	0	5	20,000	0
1,244	Birch Tor Tin Mine	9	11,196	0	—	—	
8,000	Blaenavon	50	400,000	0	$17\frac{1}{2}$	140,000	0
100	Botallack	182	18,200	0	60	6,000	0
120	Brewer	5	600	0	7	840	0
10,000	British Iron, New, regist. ..	12	120,000	0	7	70,000	0
—	Ditto ditto, scrip	10	—		10	—	
128	Budnick Consols	$52\frac{1}{2}$	6,720	0	35	4,480	0
256	Butterdon	1	256	0	5	—	
1,000	Callington	19	19,000	0	14	14,000	0
1,000	Camborne Consols	5	5,000	0	4	4,000	0
20,000	Cameron's Steam Coal	6	120,000	0	1	20,000	0
256	Caradon Mines	$22\frac{1}{2}$	5,800	0	10	2,560	0
256	Caradon United	24	6,144	0	5	1,280	0
256	Caradon Wheal Hooper	21	768	0	8	2,048	0
1,000	Carn Brea	15	15,000	0	100	100,000	0
3,000	Carthew Consols	$1\frac{1}{2}$	45,000	0	5	15,000	0
112	Charlestown	220	24,640	0	60	6,720	0
500	Comblawn	$5\frac{3}{4}$	2,875	0	3	1,500	0
128	Comfort	45	5,760	0	35	4,480	0
256	Condurrow	20	5,120	0	130	9,116	0
2,560	Cook's Kitchen	14	35,840	0	8	5,120	0
1,000	Coombe Valley Quarry	$3\frac{1}{2}$	3,500	0	$4\frac{1}{2}$	4,500	0
6,500	Cornish Mining Company ..	2	13,000	0	$2\frac{3}{8}$ $\frac{1}{2}$	16,250	0
20,000	Cornwall New Mining	1	20,000	0	1	20,000	0
1,000	Copper Bottom	$1\frac{1}{2}$	1,500	0	$6\frac{1}{2}$	6,500	0
212	Craddock Moor	$23\frac{1}{4}$	4,929	0	5	1,050	0
500	Cubert Mine	$12\frac{1}{2}$	6,250	0	—	—	
1,000	Cwm Erfin	3	3,000	0	4	4,000	0
300	D. Prior and Buckfastleigh ..	16	4,800	0	16	4,800	0
7,100	Derwent	$8\frac{1}{2}$	60,350	0	5	35,500	0
845	Devon and Courtenay Consols ..	$7\frac{3}{4}$	6,548	15	$\frac{3}{4}$	635	15
1,024	Devon Great Consols	1	1,024	0	230	135,520	0
1,000	Dhurode	2	2,000	0	5	5,000	0
186	Dolcoath	30	5,580	0	15	2,790	0
2,560	Drake Walls	5	12,800	0	4	12,240	0
10,000	Durham County Coal	45	450,000	0	9	90,000	0
3,000	Dyfngwm	10	30,000	0	$12\frac{1}{2}$	37,500	0
2,500	East Birch Tor	3	7,500	0	$3\frac{1}{2}$	8,750	0
112	East Caradon	47	5,264	0	47	5,264	0
2,048	East Crowndale	$6\frac{5}{8}$	13,056	0	$2\frac{1}{2}$	5,120	0
512	East Combe Silver-Lead.. ..	$5\frac{1}{2}$	3,328	0	$6\frac{1}{2}$	3,328	0
4,000	East Gunnis Lake, Sunden ..	$\frac{1}{2}$	2,000	0	$\frac{3}{4}$	—	
128	East Pool	15	1,920	0	60	3,840	0
9,000	East Tamar Consols	$\frac{3}{4}$	6,750	0	$1\frac{1}{2}$	6,750	0
94	East Wheal Crofty	125	11,750	0	250	23,600	0
128	East Wheal Rose..	50	6,400	0	600	76,800	0
—	East of Scotland Iron Company	5	—		$1\frac{5}{8}$	—	
1,280	Esgair Lli	$1\frac{1}{2}$	1,920	0	5	6,400	0

Shares.	Company.	Paid.	Total Cost.		Price.	Market Value.	
		£.	£.	s.	£.	£.	s.
256	Exmoor Wheal Eliza	6	1,536	0	9–10	2,560	0
512	Fowey Consols	40	20,480	0	45	23,040	0
1,024	Freidd Llwydd Mines	1¼	1,280	0	3½	3,584	0
6,400	Gadair	2	2,800	0	2	12,800	0
4,000	General Mining Comp. for Ireland	1⅝	5,500	0	1½	6,000	0
256	Gonamena	44½	11,392	0	16	4,096	0
128	Goonvrea	4	503	0	2	256	0
100	Great Consols	1,000	100,000	0	250	25,000	0
512	Great Wheal Rough Tor Consols	18½	9,472	0	20	5,632	0
1,200	Growa Slate Company	5	6,000	0	5	6,000	0
6,000	Heignston Down Consols ..	½	3,000	0	1	6,000	0
512	Herodsfoot..	27	6,912	0	15	6,144	0
10,000	Hibernian	12¼	122,400	0	1⅜	13,750	0
1,000	Holmbush	22	22,000	0	1½	1,500	0
1,024	Kingsett and Bedford	½	512	0	¾	778	0
827	Kirkcudbrightshire	8½	7,029	10	5	1,654	0
2,048	Lamherooe Wheal Maria ..	13	26,624	0	2	4,096	0
252	Lanarth Consols	—	—		10	2,520	0
256	Lelant Consols	90	11,520	0	25	7,680	0
160	Levant	—	—		120	19,200	0
1,000	Lewis	16	16,000	0	8	8,000	0
1,000	Llwyn Malees	7½	7,600	0	7	7,000	0
3,600	Llynvi Iron	50	180,000	0	50	180,000	0
6,000	Marke Valley	10	60,000	0	1½	9,000	0
5,000	Mendip Hills	3	15,000	0	1⅜–½	7,500	0
5,000	Merionethshire Slate Company..	1½	7,500	0	2	10,000	0
128	Metha	34	4,352	0	140	17,920	0
20,000	Mining Company of Ireland ..	7	140,000	0	4	80,000	0
256	New East Crowndale	3¾	960	0	2½	740	0
128	North Fowey Consols	37	4,836	0	10	1,280	0
100	North Pool..	45	4,500	0	500	16,500	0
140	North Roskear	5¼	735	0	165	23,100	0
262	North Wheal Leisure	1½	393	0	2	524	0
15,000	Northern Coal Company.. ..	23	345,000	0	2	30,000	0
128	Par Consols..	55⅜	7,088	0	1,000	128,000	0
8,000	Pennant and Craigwen	2	16,000	0	2	16,000	0
100	Penrhiw	30	3,000	0	65	6,500	0
1,024	Penzance Consols..	16*s*·3*d*.	832	0	2	2,048	0
512	Plymouth Wheal Yeoland ..	6⅛	3,136	0	10	5,120	0
200	Polsaith Consols	5½	1,100	0	4½	850	0
2,500	Rhoswiddol and Bachidon ..	10	25,000	0	10	25,000	0
10,000	Rhymney Iron	50	500,000	0	13	130,000	0
10,000	Ditto New	7	70,000	0	6⅞	68,750	0
1,000	Rosewall Hill	1	1,000	0	5	5,000	0
256	Rosewarva Mines..	—	—		—	3,072	0
2,048	Runnaford Coombe Tin ..	¾	1,536	0	—	14,336	0
128	South Caradon	5	610	0	400	51,200	0
1,100	South Dolcoath	4	4,400	0	5	5,500	0
256	South Friendship Wheal Ann ..	20	5,120	0	4	1,024	0
256	South Molton	5	1,280	0	12½	3,200	0
9,000	South Tamar	1	9,000	0	3	—	
256	South Tolgus	10	2,560	0	140	14,080	0
256	South Trelawny	28½	7,296	0	3	768	0
2,000	South Wales Mining Company	¾	1,500	0	1–1½	3,000	0
128	South Wheal Basset	110	14,080	0	150	19,200	0
124	South Wheal Frances	160	19,840	0	240	29,760	0
256	South Wheal Josiah	—	—		1½–2	512	0
1,000	South Wheal Maria	2⅞	2,750	0	1½	1,500	0
10,000	Southern and Western Irish ..	2	20,000	0	4	40,000	0
280	Spearne Moor	30	8,400	0	40	11,200	0
256	St. Austell Consols	9	2,304	0	—	—	

Shares.	Company.	Paid.	Total Cost.		Price.	Market Value.	
		£.	£.	s.	£.	£.	s.
94	St. Ives Consols	—	—		320	30,080	0
128	St. Michael Penkivel	5	640	0	10½	1,344	0
999	St. Minver Consols	1	999	0	6	5,994	0
1,000	Stray Park	43	43,000	0	26	26,000	0
9,600	Tamar Consols	3	28,800	0	8	60,000	0
1,024	Tavy Consols	4	4,096	0	4	4,096	0
6,000	Tincroft	7	42,000	0	6½	39,000	0
1,000	Tin Vale	2¾	2,750	0	3½	3,500	0
58	Tokenbury	170	9,860	0	10	580	0
256	Tollpetherwin	3½	896	0	5	1,280	0
256	Tregordan	2	512	0	8	2,048	0
256	Trehane	1¼	320	0	30	7,680	0
5,000	Treleigh Consols	6	30,000	0	1½	7,500	0
2,000	Trenance	3	6,000	0	—	—	
96	Tresavean	10	960	0	150	14,400	0
120	Trethellan	5	600	0	16	1,920	0
120	Treviskey and Barrier	130	15,600	0	250	10,440	0
100	United Mines	300	30,000	0	350	35,000	0
256	Wellington Mines	25	6,400	0	20	5,120	0
256	West Caradon	20	5,120	0	130	33,480	0
512	West Fowey Consols	40	20,480	0	12	6,144	0
256	West Providence	9	2,304	0	15	3,840	0
200	West Seton	40	8,000	0	210	42,000	0
—	West of Scotland Iron Company	240	—		90	—	
120	West Trethellan	5	500	0	30	3,600	0
256	West United Hills	—	—		4¼	1,088	0
512	West Wheal Frances	1⅔	780	0	2	1,024	0
256	West Wheal Friendship ..	9	2,304	0	8	2,048	0
3,725	West Wheal Jewel	11	40,975	0	1¼	4,656	0
256	West Wheal Tolgus	21¼	5,440	0	6	1,536	0
256	West Wheal Treasury	19	4,864	0	10	2,560	0
1,024	Whiddon Mines	4¾	4,864	0	3	3,072	0
5,200	Wicklow Copper	5	26,000	0	8	41,600	0
107	Wheal Adams	79	8,453	0	30	3,210	0
1,000	Wheal Agar	—	—		8	8,000	0
256	Wheal Albert	10	2,560	0	1	256	0
240	Wheal Anderton	23	5,520	0	15	3,600	0
128	Wheal Ann	—	—		50⅞	6,546	0
512	Wheal Anna Maria	6½	3,328	0	8	4,096	0
1,024	Wheal Ash	4½	4,608	0	8	8,192	0
120	Wheal Bal..	5½	660	0	20	2,400	0
256	Wheal Benny	14½	3,712	0	2	512	0
256	Wheal Blencowe	21	5,376	0	5	1,280	0
256	Wheal Calstock	5	1,280	0	12	1,280	0
1,024	Wheal Coad	1	1,024	0	4	4,096	0
268	Wheal Courtenay..	12½	3,350	0	15	4,020	0
256	Wheal Fortescue	6½	1,664	0	3	768	0
388	Wheal Franco	27	9,126	0	18	6,984	0
128	Wheal Harriet	45	5,760	0	—	—	
100	Wheal Henry	—	—		31½	3,150	0
1,024	Wheal Lawrence	3	3,072	0	3	3,072	0
112	Wheal Margaret	79	8,848	0	200	28,000	0
512	Wheal Mary Ann..	5	2,560	0	40	7,168	0
—	Wheal Penhale	—	—		12	—	
210	Wheal Prospect	4	840	0	7	1,470	0
120	Wheal Reeth	41	4,920	0	150	18,000	0
99	Wheal Seton	214	22,286	0	720	61,280	0
512	Wheal Sophia	3⅜	1,718	0	5	2,560	0
128	Wheal Spearne	10	1,280	0	75	9,700	0
128	Wheal St. Ann	30	3,840	0	35	4,480	0
550	Wheal Trescoll	5	2,750	0	6½	2,575	0

Shares.	Company.	Paid.	Total Cost.		Price.	Market Value.	
		£.	£.	s.	£.	£.	s.
260	Wheal Trelawny	7¾	2,015	0	87	18,720	0
256	Wheal Tremaine (St. Ervan) ..	9½	2,432	0	2⅛	554	0
1,024	Wheal Tremayne..	9⅝	9,600	0	3	3,072	0
92	Wheal Tryphena..	140	12,880	0	265	24,380	0
512	Wheal Venton	1½	768	0	2	—	
1,000	Wheal Vincent	1⅜	1,375	0	6	6,000	0
256	Wheal Vlow (Perranz)	⅜	96	0	⅜	96	0
184	Wheal Vyvyan	—	—		60	11,040	0
250	Wheal Williams	28⅜	7,093	15	8	2,000	0
1,024	William and Mary Worth ..	2	2,048	0	2½	2,562	0

FOREIGN MINES.

Shares.	Company.	Paid.	Total Cost.		Price.	Market Value.	
5,000	Alten Mining Company.. ..	14½	62,500	0	1½	7,500	0
15,000	Asturian Mining Company ..	13	195,000	0	3¾–⅞	58,135	0
20,000	Australian..	3	60,000	0	5¾–6½	130,000	0
10,000	Anglo-Mexican Company ..	100	1,000,000	0	¼	2,500	0
12,374	Ditto Subscription	25	309,350	0	1¼	15,467	0
6,000	Barossa Range	1⅜	8,250	0	1½	9,000	0
3,000	Bolanos	150	450,000	0	3	9,000	0
2,000	Ditto Scrip	15	30,000	0	3¾	7,500	0
10,000	Brazilian Imperial	23	230,000	0	7	70,000	0
12,000	Cobre Copper Company.. ..	40	480,000	0	13	156,000	0
10,000	Copiapo Mining Company ..	14	140,000	0	3	30,000	0
10,000	General Mining Association ..	20	200,000	0	10	100,000	0
—	Guadalcanal	3½	—		5½	—	0
5,000	Kinzigthal Mining Association..	2	10,000	0	3	15,000	0
20,051	Mexican Company	59	1,183,009	0	1	20,051	0
2,000	Mexican and South American ..	8	16,000	0	½	1,000	0
5,000	National Brazilian	30	150,000	0	3½	17,500	0
104,000	North British Australasian ..	1	104,000	0	¼	26,000	0
7,000	Royal Santiago	10	70,000	0	4	28,000	0
11,000	St. John del Rey..	15	165,000	0	14⅛	155,275	0
13,174	United Mexican .. .. av.	28¼	372,165	10	4¼–3¾	55,976	0

LATEST PRICES of MATERIALS in CORNWALL and DEVON.

CAST IRON.

[All Castings for an 8-inch Engine 2*s.* per cwt. above this List.]

Cylinders, Covers, Pistons, Piston Caps, Nozzles, Air Pumps and Covers, bored and turned .. .. Cylinder Cases	25*s.* per cwt.
Cylinder Bottoms, Condensers, and Bottoms	19*s.* ,,
Steam and Eduction Pipes .. .. from	8*s.* to 11*s.* ,,
Feed Pipes .. .. from	8*s.* to 10*s.* ,,
Hot Water Cisterns	15*s.* ,,
Beams, cast open	10*s.* ,,
Ditto, cast close	14*s.* ,,
Gudgeons, Troughs, Shafts, Bearings and Top Blocks, Sockets, and Saddles	9*s.* ,,
Ditto, fitted	13*s.* ,,
Hollow Stools for Beams	13*s.* ,,
Gudgeons and Shafts, turned..	12*s.* ,,
Fly Wheels	11*s.* ,,
Segments and Arms	9*s.* ,,
Centre Pieces for Wheels, Capstans, &c.	11*s.* ,,
Ditto, bored	15*s.* ,,
Spur Wheels, 1 cwt.	10*s.* ,,
Ditto, under 1 cwt..	12*s.* ,,
Bevil ditto	12*s.* ,,
Ditto, under 1 cwt	14*s.* ,,
Extra if bored or turned	16*s.* to 24*s.*
Tooth Segments	10*s.* ,,
Cranks, not bored	9*s.* 6*d.* ,,
Ditto, bored	15*s.* to 21*s.*
Manhole Branches and Doors..	11*s.* ,,
Ditto, faced	16*s.* ,,
Fire-door Frames, Sleepers, and Fire Bars, cast open	6*s.* 6*d.* ,,
Ditto .. ditto .. ditto cast close	8*s.* 6*d.* ,,
Dampers and Frames, cast open	7*s.* 6*d.* ,,
Ditto ditto cast close	8*s.* 6*d.* ,,
Plain Pumps, 4 inch bore	7*s.* ,,
Short ditto	8*s.* ,,
Working Barrels, 5 inch	13*s.* ,,
Ditto, under	16*s.* ,,
Plunger, Knee, and H-Pieces, and Top Door Pieces, under 4 feet long	12*s.* ,,
Doors and Bottoms for ditto, cast open	6*s.* 6*d.* ,,
Ditto .. ditto, cast close	8*s.* ,,
Clack-seat Pieces and Doors	10*s.* ,,
Plunger Poles for Shaft-work, 6 inches and above	22*s.* ,,
Ditto, under 6 inches	24*s.* ,,
Stuffing Boxes and Glands	19*s.* ,,
Valves, Seats, and Clacks	9*s.* ,,
Ditto ditto, turned	14*s.* ,,
Air Pipes, 4 inches diameter and 6 feet long	7*s.* 6*d.* each
Whim Shieves, 4 feet diameter	16*s.* ,,
Ditto, 3 feet 6 inches ,, ...	14*s.* ,,
Ditto, 3 feet ,, ...	12*s.* ,,
Ditto, 2 feet ,, ...	8*s.* ,,
Ditto, 1 feet 6 inches ,, ...	7*s.* 6*d.* ,,
Capstan and Whim Shieves .. .. Flat Rope Shieves	8*s.* 6*d.* per cwt.
Tram Wheels	8*s.* ,,
Ditto, bored	13*s.* ,,
Boiler Stands	6*s.* 6*d.* ,,

CAST IRON—*continued.*

Feedpole Cases, with Stuffing Boxes and Glands bored .. Plunger Cases, with Stuffing Boxes, 6 inches	24*s*. per cwt.
Sweep Rods	12*s*. ,,
Ditto, turned	20*s*. ,,
Foundation Plates	10*s*. ,,
Mortice Wheels	12*s*. ,,
Kibble Moulds	10*s*. ,,
Anvil Blocks	9*s*. ,,
Hammers, Anvils, and Bits	11*s*. ,,
Earth Eyes	10*s*. ,,
Tram Saddles	9*s*. ,,
Stamp Heads	6*s*. 6*d*. ,,
Ditto, with long shanks	8*s*. ,,
Ditto Grounds	
Stamp Tongues..	9*s*. ,,
Cams for Stamp Axles	7*s*. 6*d*. ,,
Bucking Plates	6*s*. 6*d*. ,,
Dressing Plates and Backs for Grates, cast open	8*s*. 6*d*. ,,
Ditto .. ditto .. cast close	12*s*. ,,
Crushing Rolls	7*s*. 8*d*. ,,
Ditto, cast in chills	8*s*. 6*d*. ,,
Mandrills	14*s*. ,,
Ditto, turned	20*s*. ,,
Pillars, not fluted	10*s*. ,,
Ditto, fluted	
Furnaces, Green Sand	10*s*. ,,
Ditto, Loam	12*s*. ,,
Shaft Pulleys or Rollers	8*s*. ,,
Sampling Plates	11*s*. ,,
Open Top Water Pipes	10*s*. ,,
Iron Borings	6*s*. ,,
Ditto, fine	7*s*. ,,
Angular Bars	12*s*. ,,
Frames for Crushers	10*s*. ,,
Block Tin and Ingot Moulds	13*s*. ,,
Barrow Wheels	11*s*. ,,
Wheel and Pipe Boxes	16*s*. ,,
Pall Plates	14*s*. ,,
Grate Castings, Iron	14*s*. to 16*s*. ,,
Shoes for Drags	9*s*. ,,
Hawser Pipes	20*s*. ,,
Plough Chips	10*s*. ,,
Grate Plate for Stamps, open	8*s*. 6*d*. ,,
Ditto ditto close	12*s*. ,,
Stamp Guides	11*s*. ,,
Chain Guides	8*s*. ,,
Weights, adjusted ½ cwt.	6*s*. 6*d*. each
Ditto, 14 lb.	2*s*. ,,
Ditto, 7 lb.	1*s*. 4*d*. ,,
Ditto, 4 lb.	10*d*. ,,
Ditto, 2 lb.	8*d*. ,,
Ditto, 1 lb.	5*d*. ,,
Ditto, ½ lb.	4*d*. ,,
Single Valve Boxes—	
4 inch	£4. 10*s*.
3½ inch	£3. 15*s*.
3 inch	£3. 3*s*.
2½ inch	£3. 0*s*.
2 inch	£2. 10*s*.
Boring Working Barrels	5*s*. per inch
Turning Plunger Poles	7*s*. ,,

WROUGHT IRON.

Plain Cylindrical Boilers, made of Best Plates and Best Rivet Iron	16*s*. per cwt.
Whim Kibbles, hammered Iron	16*s*. ,,
Ditto, rolled	14*s*. ,,
Winze Kibbles	7*s*. 6*d*. each
Tapered Rod Plates, hammered from Scraps, 6 inches wide and under, in Slabs	12*s*. per cwt.
Ditto, 7 inches	13*s*. ,,
Ditto, 8 inches	14*s*. ,,
Ditto, 6 inches	15*s*. ,,
Ditto, with square holes	16*s*. ,,
Ditto, 7 inches wide holes	16*s*. ,,
Ditto, square holes	17*s*. ,,
Ditto, 8 inches wide holes	17*s*. ,,
Ditto, square holes	18*s*. ,,
Miners' Shovels	26*s*. ,,
Ditto, steel point	46*s*. ,,
Flat Thread Tops	4*d*. per lb.
Valve Iron	14*s*. per cwt.
Fagoted Iron, single	10*s*. ,,
Ditto, double	12*s*. ,,
Piston and Air Pump Rods	7*d*. to 1*s*. per lb.
Kibble Plates, hammered	13*s*. per cwt.
Ditto, rolled	11*s*. ,,
Axle Arms and Shear Moulds	12*s*. ,,
Grate Plates, Rough	14*s*. ,,
Ditto, Middle-cut	20*s*. ,,
Ditto, Finished	25*s*. ,,
Furnace Bottoms	20*s*. ,,
Piston Rings, turned	9*d*. to 1*s*. per lb.
Loops	5*d*. to 8*d*. ,,
Outer Connection Caps..	21*s*. per cwt.
Best Boiler Plates (Shropshire)	12*s*. ,,
Bar Iron	18*s*. ,,
Ditto, best	10*s*. ,,
Hoop Iron	
Sheet Iron	12*s*. ,,
Nail Rods	
Vices	6*d*. per lb.
Anvils	32*s*. per cwt.
Best Proved Short-link Chain, 3-8 inch	27*s*. ,,
Ditto .. ditto 7-16 inch	25*s*. ,,
Ditto .. ditto ½ inch	25*s*. ,,
Ditto .. ditto 9-16 inch	24*s*. ,,
Ditto .. ditto 5-8 inch	22*s*. ,,
Ditto .. ditto 11-16 inch	22*s*. ,,
Ditto .. ditto ¾ inch .. .. .. Ditto .. ditto 1 inch	21*s*. ,,

STEEL.

Gad Steel	27*s*. ,,
Best (L) Blister	38*s*. to 40*s*. ,,

BRASS.

Best Composition Metal Plunger Poles, & Linings for Air Pumps	1*s*. 6*d*. per lb.
Covers, Buckets, &c. bored and turned	1*s*. 5*d*. ,,
Bearing and Bucket Brasses	11*d*. ,,
Ditto .. ditto, bored	1*s*. 2*d*. ,,
Working Barrels, bored	1*s*. 5*d*. ,,
Brass Bushings, large	2*s*. ,,
Ditto small	
Steam Valves and Seats	2*s*. 2*d*. ,,
Ditto, double beat	2*s*. 4*d*. ,,
Brasses for Parallel Motion	20*d*. to 22*d*. ,,
Ditto for Outer Connection..	1*s*. to 1*s*. 3*d*. ,,
Ditto Main Coops	1*s*. to 1*s*. 3d. ,,

TABLE OF THE RESPECTIVE WEIGHTS OF BODIES.

Names of Bodies.	Weight of a cubic foot.		Weight of a cubic inch.	Number of cubic inches in a pound.
	Ounces.	Pounds.		
METALS.			Oz.	
Zinc, cast	7,190	440·37	4·160	3·84
Iron, cast	7,207	450·43	4·228	3·83
Tin, cast	7,291	455·68	4·219	3·79
Iron, bar	7,788	486·75	4·506	3·55
Steel, hard	7,816	488·50	4·523	3·53
Steel, soft	7,833	489·56	4·532	3·52
Brass, cast	8,395	524·68	4·858	3·29
Copper, cast	8,788	549·25	5·085	3·14
Silver, pure, cast	10,474	654·62	6·061	2·63
Silver, pure, hammered ..	10,510	656·87	6·082	2·63
Lead, cast	11,352	709·50	6·569	2·43
Gold, trinket	15,709	981·81	9·090	1·75
Gold, coin	17,647	1,102·93	10·212	1·56
Gold, pure, cast	19,258	1,203·62	11·133	1·43
Gold, hammered	19,361	1,210·06	11·204	1·42
Platinum, pure	19,500	1,218·75	11·284	1·41
Platinum, hammered ..	20,336	1,271·00	11·768	1·35
STONES, EARTHS, &c.				
Coal	1,250	78·12	0·723	22·11
Sand	1,520	95·00	0·879	18·18
Earth, common	1,984	124·00	1·148	13·93
Brick	2,000	125·00	1·157	13·82
Sulphur	2,033	127·06	1·176	13·59
Clay or Loam	2,160	135·00	1·250	12·80
Stone, paving..	2,416	151·00	1·398	11·44
Stone, common	2,520	157·50	1·458	10·97
Flint and Spar	2,594	162·12	1·501	10·67
Granite, red Egyptian ..	2,654	165·87	1·535	10·41
Glass, green	2,642	165·12	1·528	10·46
Glass, white	2,892	180·75	1·673	9·56
Glass, bottle	2,733	170·81	1·581	10·11
Slate	2,672	167·00	1·546	10·34
Marble..	2,742	171·37	1·586	10·83
White Lead	3,160	197·50	1·828	8·74
Limestone	3,171	198·68	1·839	8·69
RESINS, GUMS, &c.				
Gunpowder, solid	1,745	109·06	1·009	15·84
Gunpowder, loose h. p. ..	836	52·25	0·483	33·07
Gunpowder, cls. shk. ..	937	58·56	0·542	29·50
Wax	897	56·06	0·519	30·82
Wax, bees'	965	60·31	0·558	28·65
Tallow	945	59·06	0·546	29·25
Camphor	989	61·81	0·572	27·95
Honey	1,456	91·00	0·842	18·98
Bone, ox	1,659	103·68	0·960	16·66
Ivory	1,822	113·87	1·054	15·17

TABLE OF THE RESPECTIVE WEIGHTS OF BODIES—*Continued.*

Names of Bodies.	Weight of a cubic foot.		Weight of a cubic inch.	Number of cubic inches in a pound.
	Ounces.	Pounds.		
WOODS.			Oz.	
Cork	240	15·00	0·138	115·20
Poplar	383	23·93	0·221	72·18
Larch	544	34·00	0·314	50·82
Elm and New England Fir..	556	34·75	0·321	49·72
Mahogany, Honduras ..	560	35·00	0·324	49·37
Willow..	585	36·56	0·338	47·26
Cedar	596	37·25	0·344	46·38
Pine, pitch	660	41·25	0·381	41·89
Pear-tree	661	41·31	0·382	41·82
Walnut	671	41·93	0·388	41·20
Mar Forest Fir	694	43·37	0·401	39·83
Beech	696	43·50	0·402	39·72
Cherry-tree	715	44·68	0·413	38·65
Teak	745	46·56	0·431	37·11
Maple and Riga Fir	750	46·87	0·434	36·86
Ash and Dar Oak	760	47·50	0·439	36·37
Yew, Dutch	788	49·25	0·456	35·08
Apple-tree	793	49·56	0·458	34·86
Alder	800	50·00	0·462	34·56
Yew, Spanish..	807	50·43	0·467	34·26
Mahogany, Spanish	852	53·25	0·493	32·45
Oak, Canadian	872	54·50	0·504	31·70
Box, French	912	57·00	0·527	30·31
Logwood	913	57·06	0·528	30·28
Oak, English	970	60·62	0·561	28·50
Oak, ditto sixty years old	1,170	73·12	0·677	23·63
Ebony	1,331	83·18	0·770	20·77
Lignum Vitæ	1,333	83·31	0·771	20·74
FLUIDS.				
Air at earth's surface, about	1·0286	·06428	·000595	26,881·97
Ether, sulphuric	716	44·75	0·414	38·61
Alcohol, absolute	792	49·50	0·458	34·92
Bitumen, liquid	848	53·00	0·490	32·60
Oil of Turpentine	870	54·37	0·503	31·77
Ether, muriatic	874	54·62	0·505	31·63
Oil, olive	915	57·18	0·529	30·21
Brandy..	927	57·93	0·536	29.82
Oil, linseed	932	58·25	0·539	29·66
Wine, Burgundy	991	61·93	0·573	27·89
Wine, Bourdeaux	994	62·12	0·575	27·81
Water, distilled	1,000	62·50	0·578	27·64
Tar	1,015	63·43	0·587	27·23
Vinegar	1,026	64·12	0·593	26·94
Water, sea	1,028	64·25	0·594	26·89
Milk	1,030	64·37	0·596	26·84
Beer	1,034	64·62	0·598	26·73
Acid, nitric	1,218	76·12	0·704	22·69
Water, Dead Sea	1,240	77·50	0·717	22·29
Acid, nitrous	1,550	96·87	0·897	17·83
Acid, sulphuric	1,841	115·06	1·065	15·01
Mercury	13,568	848·00	7·851	2·03

TABLE OF THE CHEMICAL ELEMENTS.

Name of Element.	Name of Discoverer.	Date.	Symbol.	Equivalent numbers.	Specific Gravity.
Oxygen	Priestly, 1774 / Scheele, 1775	1774-5	O.	8	1·102
Hydrogen	Cavendish.	1766	H.	1	0·069
Nitrogen	Rutherford.	1772	N.	14	0·972
Chlorine	Scheele.	1774	Cl.	36	2·47
Sulphur	Known to ancients.	..	S.	16	1·99
Selenium	Berzelius.	1818	Se.	40	4·32
Boron	Davy.	1807	B.	10	2·0
Phosphorus	Brandt.	1669	P.	16	1·77
Wood / Charcoal / Diamond	.. ..	..	..	..	0·441
Carbon .. .. :	Known to ancients.	..	C.	6	3·520
Iodine	Courtois.	1812	I.	126	3·084
Bromine	Balard.	1826	Br.	78	3·0
Fluorine	.. ..	..	F.	18	..
Potassium	Davy.	1807	K.	40	0·865
Sodium	Davy.	1807	Na.	24	0·972
Lithium	Davy.	1818	L.	10	..
Calcium	Davy.	1807	Ca.	20	..
Barium..	Davy.	1807	Ba.	69	2·
Strontium	Davy.	1807	Sn.	44	2· ?
Magnesium	Bussy.	1830	Mg.	12	..
Aluminium	Wohler.	1828	Al.	13	..
Silicum..	Berzelius.	1824	Si.	24	..
Glucinum	Wohler.	1828	G.	18	..
Ittrium..	Wohler.	1828	Y.	32	..
Zirconium	Berzelius.	1824	Zr.	30?	..
Thorium	Berzelius.	1829	Th.	60	..
Iron	Known to ancients.	..	Fe.	28	7·7
Lead	Known to ancients.	..	Pb.	104	11·38
Copper	Known to ancients.	..	Cu.	32	8·66
Zinc	Known in 16th century.	..	Z.	32	7·
Antimony	Known about 1490.	1490	Sb.	65	6·7
Tin	Known to ancients.	..	Sn.	58	7·28
Bismuth	Known to Agricola.	1530	Bi.	72	9·8
Manganese	Gahn and Scheele.	1774	Mn.	28	8·013
Chromium	Vauquelin.	1797	Cr.	28	5·9
Cobalt	Brandt.	1733	Co.	30	7·834
Arsenic	Brandt.	1733	As.	38	5·7
Nickel	Cronstedt.	1751	Ni.	28	8·5
Vanadium	Sefstrom.	1830	V.	68	..
Cadmium	Stromeyer.	1817	Cd.	56	8·60
Tungsten	D'Elhuyart.	1781	W.	100	17·4
Molybdenum ..	Hjelm.	1782	Mo.	48	8·6
Cerium	Berzelius and Hisinger.	1803	Ce.	48	..
Columbium ..	Hatchett.	1801	Ta.	185	6·0
Tellurium	Müller.	1782	Te.	64	6·25
Titanium	Gregor.	1791	Ti.	24	5·3
Uranium	Klaproth.	1789	U.	217	9·0
Mercury	Known to ancients.	..	Hg.	200	13·5
Silver	Known to ancients.	..	Ag.	108	10·5
Gold	Known to ancients.	..	Au.	200	19·3
Platinum	Wood, Jamaica.	1741	Pl.	96	21·2
Paladium	Wollaston.	1803	Pd.	54	11·3
Rhodium	Wollaston.	1803	R.	52	11·0
Osmium	Tennant.	1803	Os.	100	10·0
Iridium	Tennant and Descotils.	1803	Ir.	96	15·8

STONE QUARRIES.

Quarry, and where situate.	Colour.	Weight per cubic foot.
NATURE OR COMPONENT PARTS.		
Sandstone, chiefly quartz and silex.		lbs.
Abercarne, Newport, Monmouthshire	Dark bluish grey	168
Aislaby, Whitby, Yorkshire	Light brown	126½
Binnie, Uphall, Linlithgowshire	Brownish grey	140
Bramley Fall, Leeds, Yorkshire	Light brown	142¼
Craigleith, Bed Rock, near Edinburgh.. ..	Whitish grey	146
Darley Dale, Bakewell, Derbyshire	Light brown	148¼
Duke's Quarries, Cromford, Derbyshire ..	Purplish green variegt.	144½
Giffneuch, Glasgow, Lanarkshire	Pale grey	144
Glammis, Forfar, Forfarshire	Purple grey	161
Heddon, Newcastle-on-Tyne	Light brown	130¾
Hollington, Uttoxeter	Brownish grey	133
Longannet, Perthshire	Light brown	131¾
Munlochy, Ross-shire	Red and variegated	160½
Mylnefield, Dundee	Purplish grey	160
Park Spring, Leeds	Light brown	131
Rock Valley, Mansfield, Nottinghamshire ..	Brick-red	148¾
Scotgate Head, Huddersfield	Greenish grey	158
Limestone, chiefly carbonate of lime.		
Ancaster, Sleaford, Lincolnshire..	Cream-colour	139½
Barnack Mill, Stamford	Whitish brown	136¾
Box Hill, Chippenham, Wiltshire	Cream	123
Chilmark, Salisbury	Greenish brown	153½
Doulting, Shepton Mallet	Light brown	134¼
Ham Hill, Yeovil, Somersetshire	Deep ferr. brown	141¾
Hopton Wood, Worksworth, Derbyshire ..	Light grey	158½
Ketton, Stamford, Rutlandshire	Dark cream	128½
Portland (Grove Quarry), Weymouth	Whitish brown	147½
Portland (Waycroft Quarry), Weymouth ..	Ditto	135½
Purbeck, Corfe Castle, Dorset	Light brown	151
Sutton, Bridgend, Glamorganshire	Light cream	136
Taynton, Burford, Oxfordshire	Streaky brown	136
Magnesian Limestone, chiefly carbonates of lime and magnesia.		
Bolsover, Chesterfield	Yellowish brown	151¾
Brodsworth, Doncaster	Light brown	133¾
Huddlestone, Sherburne, Yorkshire	Whitish cream	137½
Mansfield-Woodhouse, Mansfield	Yellowish brown	145¾
North Auston, Rotherham	Ditto	144
Roche Abbey, Bawtry, Yorkshire	Whitish cream	139
Smawse Hall, Tadcaster, Yorkshire	Light yellowish brown	127½

24 cubic feet of sand, 17 ditto clay, 18 ditto earth, 13 ditto chalk, equal to 1 ton.

1 cubic yard of earth before digging will occupy about 1½ cubic yards when dug, and contains 21 striked bushels, which is considered a *single load*, and double these quantities a *double load.*

PART V.

Directory.

PRESENT ROYAL FAMILY.

QUEEN VICTORIA, *b.* May 24, 1819; *suc.* June 20, 1837; *cr.* June 28, 1838; *m.* Feb. 10, 1840, to

FRANCIS ALBERT AUGUSTUS CHARLES EMANUEL, Duke of Saxe, Prince of Coburg and Gotha, *b.* August 26, 1819.

Issue.

VICTORIA ADELAIDE MARY LOUISA, Princess Royal, *b.* Nov. 21, 1840.

ALBERT EDWARD, Prince of Wales, *b.* Nov. 9, 1841.

ALICE MAUD MARY, *b.* April 15, 1843.

ALFRED ERNEST ALBERT, *b.* Aug. 6, 1844. HELENA AUGUSTA, *b.* May 25, 1846.

LOUISA CAROLINE ALBERTA, *b.* March 18, 1848.

King of Hanover	*born* June 5, 1771
Duke of Cambridge	Feb. 24, 1774
Duchess of Gloucester	April 25, 1776
Duchess of Kent	Aug. 17, 1786
Duchess of Cambridge	July 25, 1795
Crown Prince of Hanover	May 27, 1817
Prince George of Cambridge	Mar. 26, 1819
Princess Augusta of Cambridge	July 19, 1822
Princess Mary of Cambridge	Nov. 27, 1833

MEMBERS OF THE HOUSE OF PEERS.

PEERS OF THE BLOOD ROYAL.

1799 Ernest Augustus, Duke of Cumberland and Teviotdale, K.G., G.C.B., G.C.H., King of Hanover

1801 Adolphus Frederick, Duke of Cambridge, K.G., G.C.B., G.C.H., Cambridge-house, 94, Piccadilly, and Kew

ARCHBISHOPS.

Canterbury.—John Bird Sumner, 1848. Lambeth-palace

York.—Thomas Musgrave, D.D., b. 1788, consecrated Bishop of Hereford, 1837, translated to York 1847. 41, Belgrave-square

DUKES.

1682 Beaufort, K.G., 22, Arlington-st.
1694 Bedford, K.G., 6, Belgrave-square
1711 Brandon, K.G., 12, Portman-squ.
1822 Buckingham, K.G., 6, Wilton-st.
1833 Cleveland, K.G., 17, St. James's-sq.
1694 Devonshire, K.G., 78, Piccadilly
1675 Grafton, 47, Clarges-street
1694 Leeds
1719 Manchester, Clarendon-hotel
1702 Marlborough, 44, Brook-street
1756 Newcastle, K.G., 17, Portman-sq.
1483 Norfolk, 21, St. James's-square
1766 Northumberland, Charing-cross
1716 Portland, 19, Cavendish-square
1675 Richmond, K.G., 51, Portland-pl.
1703 Rutland, K.G., 94, Pall Mall
1546 Somerset, Park-lane
1833 Sutherland, K.G., Stafford-house
1814 Wellington, K.G., G.C.B. Apsley-ho.

MARQUISES.

1790 Abercorn, K.G., South Audley-st.
1821 Ailesbury, K.T., 41, Grosvenor-sq.
1831 Ailsa, 57, St. James's-street
1815 Anglesea, K.G., 1, Old Burling.-st.
1831 Breadalbane, K.T., 21, Park-lane
1826 Bristol, 6, St. James's-square
1812 Camden, K.G., 9, Belgrave-square
1815 Cholmondeley, 12, Carlton-house-terrace
1849 Dalhousie
1801 Exeter, K.G., 36, Grosvenor-sq.
1793 Hertford, K.G., 13, Berkeley-sq.
1784 Lansdowne, K.G., 54, Berkeley-sq.
1838 Normanby, Reform-club
1812 Northampton, 145, Piccadilly
1789 Salisbury, K.G., 20, Arlington-st.
1786 Townsend
1837 Westminster, 33, Up. Grosvenor-st.
1551 Winchester, 158, New Bond-st.

EARLS.

1784 Abergavenny, 58, Portland-place
1682 Abingdon, 7, Albermarle-street
1696 Albemarle
1826 Amherst, G.C.H., 66, Grosvenor-st.
1730 Ashburnham, 30, Up. Grosvenor-st.
1714 Aylesford
1772 Bathurst, 4, Wilton-crescent
1815 Beauchamp, 37, Portman-square
1790 Beverley, 8, Portman-square
1815 Bradford, 43, Belgrave-square
1815 Brownlow, 12, Belgrave-square
1746 Buckinghamshire
1831 Burlington, 10, Belgrave-square
1800 Cadogan, 138, Piccadilly
1831 Camperdown, 15, Hill-street
1661 Cardigan, 36, Portman-square
1661 Carlisle, 12, Grosvenor-place
1793 Carnarvon, 43, Grosvenor-square
1814 Cathcart, K.C.B., Carlton-club
1827 Cawdor, 74, South Audley-street
1628 Chesterfield, 25, Hill-street
1801 Chichester, 22, Grosvenor-place
1776 Clarendon, G.C.B., 1, Grosv.-cres.
1753 Cornwallis, 6, Hill-street
1718 Cowper, 1, Great Stanhope-street
1801 Craven, 16, Charles-street
1711 Dartmouth, 23, St. James's-square
1816 De Grey, K.G., 4, St. James's-sq.
1761 De la Warr, 17, Up. Grosvenor-st.
1622 Denbigh, 49, Eaton-square
1485 Derby, 23, Grosvenor-square
1553 Devon
1790 Digby, 35, Brook-street
1837 Ducie, 24, Belgrave-square
1831 Durham
1837 Effingham, 57, Eaton-place
1821 Eldon, 1, Hamilton place
1844 Ellenborough, 113, Eaton-crescent
1846 Ellesmere, 18, Belgrave-square
1661 Essex
1821 Falmouth, 2, St. James's-square
1711 Ferrers
1841 Fitzhardinge, Spring-gardens
1716 Fitzwilliam, Halkin-street
1789 Fortescue, 17, Grosvenor-square
1841 Gainsborough, 9, Cavendish-sq.
1833 Granville, 16, Bruton-street
1802 Grey, 13, Carlton-house-terrace
1752 Guildford, 23, Dover-st., Piccadilly
1719 Harborough, Steven's-hotel
1754 Hardwicke, Carlton-club
1812 Harewood, 13, Hanover-square
1742 Harrington, Whitehall-gardens
1809 Harrowby, 39, Grosvenor-square
1821 Howe, G.C.H., Curzon-house
1529 Huntingdon, Union-club
1756 Ilchester, 31, Old Burlington-st.
1697 Jersey, 38, Berkeley-square
1837 Leicester
1831 Lichfield
1626 Lindsey

1796 Liverpool, G.C.B., Mid. Scot.-yard
1807 Lonsdale, 14 & 15, Carlt.-ho.-terr.
1838 Lovelace, 19, Gt. Cumberland-st.
1721 Macclesfield, 9, Conduit-street
1800 Malmsbury, 8, Whitehall-gardens
1792 Mansfield, K. T., Carlton-club
1806 Manvers, 13, Portman-square
1813 Minto, G.C.B., 48, Eaton-square
1815 Morley, Kent-ho., Knightsbridge
1789 Mt. Edgecombe
1831 Munster, Windsor-barracks
1805 Nelson, Carlton-club
1801 Onslow, Clarendon-hotel
1806 Orford, White's-club
1711 Oxford
1551 Pembroke, 7, Carlton-house-terr.
1721 Pomfret, 62*a*, Grosvenor-street
1743 Portsmouth
1706 Poulett, 9, Gt. Stanhope-street
1804 Powis, 45, Berkeley-square
1765 Radnor, 52, Grosvenor-street
1833 Ripon, 1, Carlton-gardens
1801 Romney, 7, Grosvenor-street
1801 Rosslyn
1815 St. Germans, 36, Dover-street
1660 Sandwich
1690 Scarborough, 41, South-street
1672 Shaftesbury, 24, Grosvenor-sq.
1442 Shrewsbury, Mivart's-hotel
1821 Somers, 45, Grosvenor-place
1765 Spencer, Spencer-house
1628 Stamford, 33, Hill-st., Berkeley-sq.
1718 Stanhope, 26, Dover-street
1821 Stradbrooke, 18, Queen-street
1847 Strafford, G.C.B., G.C.H., 44, Grosvenor-street
1603 Suffolk, 9, Clarges-street
1784 Talbot, Carlton-club
1714 Tankerville, 23, Hertford-street
1815 Verulam, 40, Grosvenor-square
1685 Waldegrave, 4, Harley-street
1746 Warwick, K. T., 7, Carlton-gardns.
1624 Westmorland, G.C.B., 12, Upper Harley-street
1801 Wilton, 7, Grosvenor-square
1628 Winchelsea, 2 & 3, Old Palace-yd.
1837 Yarborough, 17, Arlington-street
1838 Zetland, 19, Arlington-street

VISCOUNTS.

1823 Beresford, G.C.B. 16, Cavendish-sq.
1712 Bolingbroke, 35, Mortimer-street
1828 Canning, 10, Grosvenor-square
1835 Canterbury, 4, Bolton-row
1826 Combermere, G.C.B., G.C.H., 48, Belgrave-square
1816 Exmouth, Carlton-club
1849 Gough
1846 Hardinge, G.C.B., 15, Stanhope-st.
1550 Hereford
1842 Hill, Carlton-club
1766 Maynard, 38, Grosvenor-square
1802 Melville, K.T., 3, Somerset-place
1839 Ponsonby, G.C.H.
1801 St. Vincent, Grosvenor-hotel
1805 Sidmouth, 78, Cadogan-place
1789 Sydney, 3, Cleveland-square
1721 Torrington

BISHOPS.

		Cons.
Rt.Hn.Dr.C.J.Blomfield	London	1824
Dr. E. Maltby	Durham	1831
Dr. C. R. Sumner	Winchester	1826
Dr. J. Kaye	Lincoln	1820
Dr. C. Bethell	Bangor	1824
Hon. Dr. H. Percy	Carlisle	1827
Dr. G. Murray	Rochester	1813
Hon. Dr. R. Bagot	Bth.&Wells	1829
Dr. J. H. Monk	Glos.&Bris.	1830
Dr. H. Phillpotts	Exeter	1830
Dr. C. H. Longley	Ripon	1836
Dr. E. Denison	Salisbury	1837
Dr. G. Davys	Peterboro.	1839
Dr. C. Thirlwall	St. David's	1840
Dr. H. Pepys	Worcester	1840
Dr. A. T. Gilbert	Chichester	1842
Dr. J. Lonsdale	Lichfield	1843
Dr. T. Turton	Ely	1845
Dr. S. Wilberforce	Oxfod	1845
Dr. T. V. Short	St. Asaph.	1841
Dr. J. P. Lee	Manchester	1847
Dr. Hampden	Hereford	1847
Dr. J. Graham	Chester	1848
Dr. S. Hinds	Norwich	1849
Dr. A. Olivant	Llandaff	1849

BARONS.

1801 Abercromby
1835 Abinger, 4, New-street
1801 Alvanley
1605 Arundell, Union-club
1835 Ashburton, 82, Piccadilly
1794 Auckland, Bp. of Sodor and Man, Kensington-gore
1297 Audley
1780 Bagot, Carlton-club
1837 Bateman, 52, South-street
1797 Bayning, University-club
1433 Beaumont, 18, Curzon-street
1455 Berners
1784 Berwick, 1, Stable-yard
1823 Bexley, 31, Great George-street
1797 Bolton, Thomas's-hotel
1761 Boston, United Service-club
1788 Braybrooke, 10, NewBurlington-st.
1830 Brougham, 4, Grafton-street
1643 Byron, 21, Eaton-place
1796 Calthorpe, 33, Grosvenor-square
1841 Campbell, South-place
1344 Camoys, 12, Dorset-square
1834 Carew
1796 Carrington, Whitehall-yard
1784 Carteret
1815 Churchill, 2, Upper Wimpole-street
1672 Clifford, Ford's-hotel, Man.-square
1299 Clinton
1789 Cloncurry, 60, St. James's-square
1839 Colborne, 19, Hill-street
1817 Colchester, 76, South Audley-st.
1841 Congleton
1836 Cottenham, 15, Park-lane

1828 Cowley
1806 Crewe, 2, Hill-street
1307 Dacre, 2, Chesterfield-street
1839 De Freyne, 45, Oxford-terrace
1821 Delamere, 33, Upper Brook-street
1835 De Lisle, 16, New-Burlington-st.
1838 De Mauley, 21, St. James's-place
1834 Denman, 38, Portland-place
1264 De Ros
1831 De Saumarez, University-club
1826 De Tabley, Mivart's-hotel
1831 Dinorben, 75, South Audley-street
1786 Dorchester, Christie's-hotel
1615 Dormer
1790 Douglas
1839 Dunfermline
1780 Dynevor, 34, Dover-street
1806 Erskine
1826 Feversham, 25, Belgrave-square
1776 Foley, 26, Grosvenor-square
1821 Forester, 21, Charles-street
1800 Gardner, 46, Dover-street
1824 Gifford
1835 Glenelg, H., 4, Albany
1832 Godolphin
1782 Grantley, Carlton-club
1289 Hasting, 5, Southwick-place
1815 Harris, 30, Albermarle-street
1835 Hatherton, 4, Halkin-terrace
1776 Hawke
1828 Heytesbury, G.C.B.
1792 Holland, Kensington
1597 Howard de Walden
1831 Howden, 13, Hereford-street
1839 Keane, United Service-club
1788 Kenyon, 9, Portman-square
1836 Langdale, Roehampton
1839 Leigh, 30, Portman-square
1797 Lilford, 10, Grosvenor-place
1850 Londesborough
1837 Lovat, Brooks's-club
1827 Lyndhurst
1794 Lyttleton, 38, St. James's-place
1807 Manners, 56, Upper Brook-street
1838 Metheun, 128, Park-street
1711 Middleton, 11, Montagu-street
1847 Milford, St. George's-hotel
1728 Monson, 1, Lincoln's-inn-fields
1839 Monteagle, 7, Park-street
1741 Montfort, 24, Upper Montagu-st.
1831 Mostyn, 9, Lower Seymour-street
1797 Northwich, 44, St. James's-place
1850 Overstone
1831 Panmure, 9, Cornwall-terrace
1603 Petre, 3, Mansfield-street
1827 Plunket
1831 Poltimore, 25, Grosvenor-square
1837 Portman, 38, Bryanstone-square
1821 Ravensworth, Percy Cross, Fulhm.
1821 Rayleigh, United University-club
1802 Redesdale, 6, Park-place
1797 Ribbesdale
1802 Rivers
1782 Rodney
1796 Rossmore, Brooks's-club
1558 St. John, Carlton-club
1802 Sandys, 48, Curzon-street
1447 Saye and Sele, 43, Grosvenor-st.
1761 Scarsdale
1840 Seaton, G.C.B., G.C.H., U.S. Club
1784 Sherborne
1828 Skelmersdale, 55, Portland-place
1760 Sondes, 32, Grosvenor-square
1780 Southampton, 32, Curzon-street
1640 Stafford
1839 Stanley, of Alderley, 40, Dover-st.
1448 Stourton
1839 Stuart de Decies
1838 Sudeley, 35, Dover-street
1786 Suffield, 12, Gt. Marlborough-st.
1616 Teynham
1792 Thurlow, Fladong's-hotel
1523 Vaux of Harrowden, Limmer's-ho.
1762 Vernon, 12, Gt. Marlborough-st.
1841 Vivian, Reform-club
1780 Walsingham, 22, Arlington-street
1664 Ward, Park-lane
1839 Wenlock, 29, Berkeley-square
1826 Wharncliffe, 9, Upper Brook-street
1492 Willoughby de Brooke, 21, Hill-st.
1313 Willoughby d'Eresby, 142, Piccadilly
1797 Wodehouse, Mivart's-hotel
1838 Wrottesley, Everall's-hotel
1829 Wynford, Maungny's-hotel

IRISH PEERS.

The following Irish Peers have seats in the House of Lords as Peers of the United Kingdom.

1739 Besborough, E. (B. Ponsonby), Brooks's-club
1789 Carysfort, E. (B. Carysfort)
1763 Charlemont, E. (B. Charlemont), 49, Lower Grosvenor-street
1803 Clancarty, E. (V. Clancarty)
1825 Clanricarde, M. (B. Somerville), 2, Carlton-house-terrace
1776 Clanwilliam, E. (B. Clanwilliam), 32, Belgrave-square
1795 Clare, E. (B. Fitzgibbon), 35, Lowndes-square
1781 Clifden, V. (B. Mendip), Whitehall
1816 Conyngham, M. (B. Minster), 5, Hamilton-place
1620 Cork, E. (B. Boyle), 3, Hamilton-pl.
1762 Courtoun, E. (B. Saltersford)
1797 Cremorne, B. (B. Dartrey), 3, Gt. Stanhope-street
1725 Darnley, E. (B. Clifton)
1790 Donegal, M. (B. Fisherwick), 28, Lowndes-street
1800 Donoughmore, E. (V. Hutchinson), 17, Conduit-street
1789 Downshire, M. (E. Hillsborough), 21, Hanover-square
1791 Drogheda, M. (B. More)
1733 Egmont, E. (B. Lovell)
1801 Ely, M. (B. Loftus), Carlton-club
1789 Enniskillen, E. (B. Grinstead), Athenæum-club
1759 Fife, E. K. T. (B. Fife), Union-club
1628 Fingall, E. (B. Fingall), Brks.'s cb.

1720 Gage, V. (B. Gage), 4, Whitehall-yard
1806 Gosford, E. (B. Worlingham), Brooks's-club
1800 Headfort, M. (B. Kenlis), Brooks's-club
1841 Kenmare, E. (B. Kenmare), 11, Belgrave-square
1768 Kingston, E. (B. Kingston)
1766 Leinster, D. (V. Leinster), 6, Carlton-house-terrace
1795 Leitrim, E. (B. Clements), 2, Grosvenor-square
1803 Limerick, E. (B. Foxford), 74, St. James's-street
1806 Lismore, V. (B. Lismore)
1816 Londonderry, M. (E. Vane), Holderness-house
1785 Longford, E. (B. Silchester), 24, Bruton-street
1660 Massareene, V. (B. Oriel)
1627 Meath, E. (B. Chaworth)
1781 Melbourne, V. (B. Melbourne), 12, Hyde-park-terrace
1717 Middleton, V. (B. Brodrick)
1760 Mornington, E. (B. Maryborough)
1825 Ormonde, M. (B. Ormonde)
1831 Ranfurly, E. (B. Ranfurly)
1771 Roden, E. (B. Clanbrassill), United Service-club
1771 Sefton, E. (B. Sefton), 37, Belgrave-square
1756 Shannon, E. (B. Carleton), 44, Brook-street
1816 Sheffield, E. (B. Sheffield), 20, Portland-place
1800 Sligo, M. (B. Monteagle)
1628 Strangford, V. (B. Penshurst)
1780 Waterford, M. (B. Tyrone), Mivart's-hotel

SCOTCH PEERS.

The following Scotch Peers have seats in the House of Lords as Peers of the United Kingdom.

1682 Aberdeen, E. (V. Gordon), 7, Argyll-street
1701 Argyll, D. (B. Sundridge), 2, Hamilton-place
1703 Atholl, D. (E. Strange), Carlton-club
1650 Balcarres, E. (B. Wigan), 21, Berkeley-square
1647 Belhaven, B. (B. Hamilton), 30, Albemarle-street
1663 Buccleuch, D., K.G. (E. of Doncaster), Whitehall-gardens
1633 Dalhousie, E. (M. Dalhousie), (abroad)
1507 Eglinton, E. (B. Androssan), 10, St. James's-square
Elgin, E. (Baron)
1453 Errol, E. (B. Kilmarnock)
1620 Falkland, V. (B. Hunsdon)
1623 Galloway, E. (B. Stewart of Garlies), 45, Grosvenor-square
1703 Glasgow, E. (B. Ross)
1619 Haddington, E. (B. Melrose), 43, Berkeley-square
1643 Hamilton, D., K.G. (D. of Brandon), 12, Portland-square
1599 Huntly, M. (B. Meldrum), 24, Chapel-street
1682 Kinnaird, L. (B. Rossle), 33, Grosvenor-street
1704 Kinnoul, E. (B. Hay), 58, Green-st.
Kintore, E. (as Baron Kintore)
1624 Lauderdale, E. (B. Lauderdale), 1, Regent-street
1675 Lennox, D. (D. Richmond), 51, Portland-place
1707 Montrose, D. (E. Graham), 45, Belgrave-square
1561 Moray, E. (B. Stuart)
1703 Rosebery, E. (B. Rosebery), 139, Piccadilly
1707 Roxburgh, D. (E. Innes), Clarendon-hotel
1703 Stair, E. (B. Oxenfoord)
1633 Wemyss, E. (B. Wemyss), 19, Stratford-place

IRISH REPRESENTATIVE PEERS.

1793 Bandon, E., 40, Lowndes-square
1621 Blayney, B., 76, Jermyn-street
1800 Caledon, E., 5, Carlton-house-ter.
1812 Castlemaine, B., Carlton-club
1763 Charlemont, E., 49, Grosvenor-st.
1806 Charleville, E.
1800 Clarina, B., 45, Up. Grosvenor-st.
1790 Clonbrock, B.
1797 Crofton, P.
1723 Desart, E.
1776 De Vesci, V., 57, St. James's-st.
1785 Doneraile, V., Limmer's-hotel
1822 Downes, B., K.C.B., Carlton-club
1800 Dunally, B., Union-club
1822 Dunraven, E., 94, Eaton-square
1780 Erne, E.
1756 Farnham, B., 44, Brook-street
1816 Glengall, E., 34, Grosvenor-street
1806 Gosford, E., G.C.B., Brooks's-club
1793 Hawarden, V., 5, St. George's-pl.
1806 Lorton, V., 18, Chesham-place
1806 Rosse, E., Royal Society
1756 Lanesborough, E.
1795 Lucan, E., 20, Hanover-square
1781 Mountcashel, E., Conservative-club
1795 O'Neill, V., United Service-club
1822 Westmeath, M., 116, Pall Mall
1793 Wicklow, E., K.P., 2, Cavendish-sq.

SCOTCH REPRESENTATIVE PEERS.

Elected every Parliament.

1509 Elphinstone, 14, St. George's-place
1445 Gray, B., St. George's-hotel
1605 Home, E.
1690 Leven, E.
1458 Morton, E., 7, Old Palace-yard
1696 Orkney, E.
1690 Polwarth, B., Carlton-club

1609 Colville, B.
1612 Blantyre, B.
1651 Rollo, B., Carlton-club
1701 Seafield, E., Clarendon-hotel
1445 Saltoun, B., 1, Gt. Cumberland-st.
1489 Sinclair, B., United Service-club
1646 Selkirk, E., Grosvenor-hotel
1686 Strathallan, V., 44, Charles-street
1694 Tweeddale, M., K.T. (India)

IRISH BISHOPS.

Four of the Irish Bishops sit by annual rotation in the House of Lords. The following occupy seats at present:—

Archbp. of Armagh	Bishop of Down
Bishop of Derry	Bishop of Limerick

PEERS WHO ARE MINORS.

	Of age
H.R.H. Albert Edward Prince of Wales, K.G.	1862
Duke of St. Alban's	
Marquis of Bath	1852
Marquis of Bute	1868
Earl of Coventry	1859
Earl of Dunmore	1862
Earl of Granard	1854
Marquis of Hastings	1853
Viscount Hood	1859
Earl of Hopetoun	1852
Marquis of Lothian	1853
Baron Lurgan	1852

ELDEST SONS OF PEERS.

The following have seats in the House of Lords.

Title of courtesy	*Sits as*	*Son of*
Bruce, Earl	B. Bruce	M. Ailesbury
Stanley, Lord	B. Stanley	E. of Derby
Uxbridge, Earl	B. Paget	M. Anglesey
Acheson, Vic.	B. Acheson	E. Gosford
Hn. E. J. Stanley	B. Eddisbury	B. Stanley

PEERESSES IN THEIR OWN RIGHT.

1840 Duchess of Inverness
1264 Baroness le Despencer
1299 Baroness de Clifford
1308 Baroness de la Zouche
1324 Baroness Grey de Ruthyn
1509 Baroness Braye
1554 Baroness North
1794 Baroness Basset
1803 Baroness Keith
1834 Baroness Wenman
1836 Baroness Stratheden

MEMBERS OF THE HOUSE OF COMMONS.

ENGLAND AND WALES,
498 MEMBERS.

Speaker.—Rt. Hon. C. S. Lefevre.

Abingdon.—Sir F. Thesiger, 11, Bryanstone-square

Andover.—J. H. Coles, 25, Portman-sq. W. Cubitt, Gray's-inn-road

Anglesea.—Sir R. B. Bulkeley, Bart., 87, Eaton-square

Arundel.—Earl of Arundel, 11, Carlton-house-terrace

Ashburton.—Lt.-Col. T. Mattheson, 8, St. James's-street

Ashton-under-Lyne.—C. Hindley, Dartmouth-house, Westminster

Aylesbury.—Q. Dick, 20, Curzon-street. Lord Nugent, Reform-club

Banbury.—H.W. Tancred, 104, Pall Mall

Barnstaple.—R. Bremridge, 16, Regent-street. Hon. J. Fortescue, 17, Grosvenor-square

Basset Law.—Hon. A. Duncombe, 22, Grosvenor-square. Vict. Galway, 45, Brook-street

Bath. —Viscount Duncan, 15, Hill-street. Lord Ashley, 49, Upper Brook-street

Beaumaris.—Lord G. Paget, 1, Old Burlington-street

Bedford.—H. Stuart, 18, Hill-street. Sir H. Verney, Bart., 5, Park-street

Bedfordshire.—Visc. Alford, 23, Belgrave-square. F. C. H. Russell, 8, Eaton-place

Berkshire.—R. Palmer, 16, Suffolk-st. Visct. Barrington, 20, Cavendish-sq. P. Pusey, 35, Grosvenor-square

Berwick-upon-Tweed. — M. Foster, 5, New City-chambers. J. C. Renton, Conservative-club

Beverley.—J. Townelay, 76, Eaton-place. S. W. L. Fox, 3, St. James's-square

Bewdley.—Lord Mandeville, 129, Mount-street

Birmingham.—G.F. Muntz, 2, St. James's square. W. Scholefield, Reform-club

Blackburn.—J. Hornby, 22, Park-cres. J. Pilkington, Queen's-hotel

Bodmin.—J. Wyld, Charing-cross East. H. C. Lacy, Richmond

Bolton.—Sir J. Walmesley, 101, Hyde-park-terrace. Stephen Blair

Boston.—Capt. Anderson, R.N. B. B. Cabbell, 1, Brick-court

Bradford.—W. Busfeild, 15, Bury-street. Col. P. Thompson, Free Trade-club

Brecknockshire.—J. Bailey, 26, Belgrave-square

Brecon.—Col. J. L. V. Watkins, Athenæum-club

Bridgnorth.—T. C. Whitmore, Carlton-club. Sir R. Pigot, Bart., London-hotel

Bridgwater.—H. Broadwood, 9, Argyll-st. C. K. Tynte, Brooks's-club
Bridport.—T. A. Mitchell, B 6, Albany. B. Cochrane, Farrance's-hotel
Brighton.—Capt. Pechell, 6, Stratford-place. Lord A. Hervey, 6, St. James's-square
Bristol.—P. W. S. Miles, 44, Belgrave-square. Hon. F. Berkeley, 1, Victoria-square
Buckingham.—Marquis of Chandos, Carlton-club. Col. J. Hall, Hyde-park-barracks
Buckinghamshire.—Hon. C. Cavendish, Burlington-house. C. Du Pre, 40, Portland-place. B. Disraeli, 1, Grosvenor-gate
Bury.—R. Walker, 5, Gt. Ryder-street
Bury St. Edmunds.—Earl Jermyn, 47, Eaton-place. E. H. Bunbury, 15, Jermyn-street
Calne.—Earl of Shelburne, Lansdowne-house
Cambridge.—Hon. W. Campbell, Stratheden-house. A. S. Adair, 2, Chapel-street
Cambridgeshire.—Hon. E. Yorke, 144, Park-street. R. Townley, Limmer's-hotel. Lord G. Manners, Knightsbridge-barracks
Cambridge University.—H. Goulburn. Hon. C. E. Law, 72, Eaton-place
Canterbury.—Hon. G. Smythe, 68, Harley-street. Col. Romilly
Cardiff Boroughs.—Rt. Hon. Dr. Nickoll, 33, Belgrave-square
Cardigan, &c.—P. Pryse, Gloucester-hotel
Cardiganshire.—Col. W. E. Powell, 7, Hyde-park-terrace
Carlisle.—W. N. Hodgson. P. H. Howard, 15, Gloucester-place
Carmarthen, &c.—D. Morris, 8, St. James's-place
Carmarthenshire.—Hon. G. Trevor, 11, Hyde-park-gardens. D. A. S. Davies, University-club
Carnarvon.—W. B. Hughes, Carlton-club
Carnarvonshire.—Hon. E. G. Pennant, 36, Belgrave-square
Chatham.—Right Hon. Visc. Enfield, 95, Eaton-square
Cheltenham.—C. L. G. Berkeley
Cheshire, North.—W. T. Egerton, 43, Wilton-crescent. Geo. C. Leigh, Knightsbridge
Cheshire, South.—Sir P. Egerton, Bart., Carlton-club. J. Tollemache, 40, Wilton-crescent
Chester.—Earl Grosvenor, 33, Up. Grosvenor-street. Sir J. Jervis, 47, Eaton-square
Chichester.—Lord H. Lennox, 51, Portland-place. J. A. Smyth, 47, Belgrave-square
Chippenham.—J. Neeld, 6, Grosvenor-sq. Capt. H. Boldero, Carlton-club
Christchurch.—Hon. E. Harris, 8, Whitehall-gardens
Cirencester.—J. R. Mullings, 40, Duke-street. Viscount Villiers, 38, Berkeley-square
Clitheroe.—M. Wilson, 65, Quadrant
Cockermouth.—H. A. Aglionby, 5, Brick-court. E. Horsman, 6, Upper Brook-street
Colchester.—Lord J. Manners, 94, Pall Mall. J. A. Hardcastle, 19, Whitehall-place
Cornwall, East.—W. H. Carew, 38, St. James's-place. T. I. A. Robartes, 42, Westbourne-terrace
Cornwall, West.—E. Pendarves, 36, Eaton-pl. Sir C. Lemon, Bart., 46, Charles-street
Coventry.—Rt. Hon. E. Ellice, 11, Arlington-street. G. J. Turner, 23, Park-crescent
Cricklade.—J. Neeld, 101, Gloucester-place. A. L. Goddard, 58, Chester-sq.
Cumberland, East.—Hon. C. Howard, 56, Park-st. W. Marshall, 85, Eaton-square
Cumberland, West.—E. Stanley, Carlton-club. H. Lowther, 31, Bruton-street
Dartmouth.—G. Moffat, 103, Eaton-sq.
Denbigh Borough.—F. R. West, Carlton-club
Denbighshire.—Sir W. Wynn, Bart., 18, St. James's-sq. Hon. W. Bagot, 23, St. James's-square
Derby.—L. Heyworth. M. T. Bass
Derbyshire, North.—Hon. G. Cavendish, 4, Belgrave-sq. W. B. Evans, Park-house
Derbyshire, South.—W. Mundy, 19, Pall Mall. C. R. Colville, B 4, Albany
Devizes.—Lieut.-Col. J. B. Estcourt, 82, Eaton-pl. G. H. Heneage, Grosvenor-hotel
Devonport.—H. Tuffnell, 37, Curzon-st. Sir J. Romilly, 32, Gordon-square
Devonshire, North.—Sir T. Acland, Bt., Waterloo-hotel. L. W. Buck, 12, Norfolk-street
Devonshire, South.—Sir J. Buller, Bt., 39, Belgrave-square. Sir R. Lopes, Bt., 46, Grosvenor-street
Dorchester.—Col. G. Damer, 2, Audley-square. H. C. Sturt, 16, Portman-sq.
Dorsetshire.—H. K. Seymer, Carlton-clb. G. Bankes, 5, Old Palace-yard. J. Floyer, 5, Old Palace-yard
Dover.—Sir G. Clerk, Bart., 8, Park-st. E. R. Rice, United University-club
Droitwich.—Sir J. S. Packington, 41, Eaton-square
Dudley.—J. Benbow, 26, Mecklenburg-square
Durham.—T. Granger, 12, King's-bench-walk. H. J. Spearman, 2, Grafton-st.

Durham County, North.—R. D. Shafto, Boodle's-club. Visc. Seham, Mivart's-hotel

Durham County, South.—Lord H. Vane, 1, Grosvenor-place-houses. J. Farrer, 14, Queen-street, May-fair

Essex, North.—Sir J. Tyrrell, Bart., Carlton-club. Major Beresford, 2, Eaton-square

Essex, South.—T. Bramston. Sir E. Buxton, Bart., 10, Up. Grosvenor-street

Evesham.—Lord M. Hill, 2, Chesham-st. Sir H. Willoughby, Bart., 63, Lower Brook-street

Exeter.—E. Divett, 97, Eaton-sq. Sir J. Duckworth, 109, Jermyn-street

Eye.—Sir E. Kerrison, Bart., 13, Great Stanhope-street

Finsbury.—T. Wakley, 1, Bedford-st. T. S. Duncombe, Palace-chambers

Flint Boroughs.—Sir J. Hanmer, Bart., 59, Eaton-place

Flintshire.—Hon. F. Mostyn, 9, Lower Seymour-street

Frome.—Col. Boyle, 26, Hill-street

Gateshead.—W. Hutt, 39, Maddox-st.

Glamorganshire.—Viscount Adare, 94, Eaton-square. C. R. M. Talbot, 3, Cavendish-square

Gloucester.—H. T. Hope, 1, Mansfield-st. Hon. M. Berkeley, Admiralty

Gloucestershire, East.—Marquis of Worcester, 27, Berkeley-square. Sir C. Codrington, 3, Park-place

Gloucestershire, West.—Hon. G. Berkeley, Cox's-hotel. R. B. Hale, 15, Bolton-street

Grantham.—G. E. Welby, 8, Upper Belgrave-street. Hon. F. Tollemache, Athenæum-club

Great Grimsby.—E. Heneage, 39, Charles-street

Greenwich.—J. W. D. Dundas, Admiralty. E. G. Barnard, Deptford

Guildford.—Capt. R. Mangles, Athenæum-club. H. Currie

Halifax.—Sir C. Wood, Bart., 12, Downing-street. Capt. H. Edwards, Conservative-club

Hampshire, North.—C. S. Lefevre (the Speaker). Melville Portal

Hampshire, South.—H. C. Compton, 34, Upper Eaton-st. Lord C. Wellesley, Apsley-house

Harwich.—Sir J. C. Hobhouse, Bt., 42, Berkeley-sq. J. Bagshaw, 10, Bridge-street

Hastings.—M. Brisco, 38, Devonshire-place. R. Holland, 63, Portland-pl.

Haverfordwest.—J. Evans, 11, Crown-office-row

Helston.—Sir R. Vyvyan, Bart., St. Dunstan's-villa

Hereford.—Sir R. Price, Bt., 11, Stratton-st. H. Clifford

Herefordshire.—J. Bailey, jun., 26, Belgrave-sq. G. Lewis, Kent-ho. R. Haggitt, Maungy's-hotel

Hertford.—Viscount Mahon, 41, Grosvenor-pl. Hon. W. F. Cowper, Admlty.

Hertfordshire.—T. P. Hasley, Carlton-club. Sir H. Meux, Bt., 41, Up. Brook-st. T. Brand, Burlington-house

Honiton.—J. Locke, 6, Chester-ter. Sir W. Hogg, Bart., 16, Grosvenor-sq.

Horsham.—Lord Howard, 12, St. James's-square

Huddersfield.—W. R. Stansfield, 22, Charles-street

Hull.—J. Clay, 25, Montague-sq. M. T. Baines, Somerset-pl.

Huntingdon.—Col. J. Peel, 8, Park-pl. T. Baring, 40, Charles-st.

Huntingdonshire.—J. Fellowes, 3, Belgrave-sq. G. Thornhill, 17, Lower Grosvenor-st.

Hythe.—E. D. Brockman, Reform-club

Ipswich.—J. C. Cobbold, Athenæum-club. H. E. Adair, 2, Chapel-st. W.

Kendal.—G. C. Glynn, 1, Up. Eccleston-st.

Kent, East.—J. P. Plumtre, University-club. W. Deedes

Kent, West.—Sir E. Filmer, 90, Eaton-sq. T. L. Hodges, 15, Suffolk-st.

Kidderminster.—J. Best, Inner Temple-hall

Knaresborough.—Hon. W. Lascelles, Carlton-club. J. P. Westhead, 1, Chester-terrace

Lambeth.—C. D'Eyncourt, Reform-club. C. Pearson, 10, Park-st.

Lancashire, North.—J. W. Patten, 24, Hill-street. J. Heywood, Maungy's-hotel

Lancashire, South.—W. Brown, Fenton's-hotel. A. Henry, Free-Trade-club

Lancaster.—T. Greene. 19, Duke-st., Westmr. R. B. Armstrong, 29, Chester-square

Launceston.—Rear-Adm. W. Bowles, 8, Hill-street

Leeds.—W. Beckett, 18, Up. Brook-st. J. G. Marshall, 37, South-street

Leicester.—J. Ellis. R. Harris

Leicestershire, North.—Lord C. Manners, E 3, Albany. E. B. Farnham, Maungy's-hotel

Leicestershire, South.—Sir H. Halford, Bt., 5, Albert-road. C. W. Packe, 7, Richmond-terrace

Leominster.—F. Peel, 4, Whitehall-gardens. G. Arkwright, D 2, Albany

Lewes.—Hon. H. Fitzroy, 42, Upper Grosvenor-st. R. Perfect, 14, Gloucester-square

Lichfield.—Lord A. H. Paget, 18, Berkeley-square. Viscount Anson, C 5, Albany

Lincoln.—Col. C. D. W. Sibthorp, 27, Chester-street. T. B. Hobhouse, 5, Brick-court

Lincolnshire, North.—R. A. Christopher, 23, Chesham-place. Sir M. Cholmeley, 10, Upper Belgrave-st.

Lincolnshire, South.—Sir J. Trollope, 35, Portland-pl. Lord Burghley

Liskeard.—R. B. Crowder, 17, Carlton-house-terrace

Liverpool.—Sir T. Birch, Bt., 55, Jermyn-st. E. Cardwell, 3, Whitehall-gard.

London.—Lord J. Russell, 32, Chesham-place. Sir J. Duke, Reform-club. Baron L. de Rothschild, 148, Piccadil. J. Masterman, 35, Nicholas-lane

Ludlow.—H. B. Clive, Carlton-club. H. Salway, Reform-club

LymeRegis.—T.N.Abdy, 65, S.Audley-st.

Lymington.—W.A. Mackinnon, 4, Hyde-park-pl. Col. Keppel, 12, Stanhope-place

Lynn Regis.—Visc. Jocelyn, Kew-green. Hon. E. Stanley, 2, Grosvenor-crescent

Macclesfield.—J. Brocklehurst, 33, Milk-st. J. Williams, 111, Oxford-st.

Maidstone.—A.J. B. Hope, 1, Connaught-pl. G. Dodd, 9, Grosvenor-pl.

Malden.—T. B. Lennard, 9, Hyde-park-ter. D. Waddington, 12, Haymarket

Malmesbury.—Hon. J. K. Howard

Malton.—J.E. Dennison, Burlington-ho. J. W. Childers, 100, Eaton-sq.

Manchester.—Rt. Hon. T. M. Gibson, 50, Wilton-crescent. J. Bright, Free-Trade-club

Marlborough.—Lord E. Bruce, 7, St. George's-place. Major H. B. Baring

Marlow.—T. P. Williams, 41, Berkeley-square. Col. B. Knox, 28, Wilton-crescent

Marylebone.—Sir B. Hall, Bt., Brooke's-club. Lord D. C. Stuart, 34, St. James's-place

Merionethshire.—R. Richards, 21, Park-crescent

Merthyr Tydvil.—Sir J. J. Guest, Bart., 8, Spring-gardens

Middlesex.—Lord R. Grosvenor, 107, Park-st. R. Osborne, Reform-club

Midhurst.—S. H. Walpole, 15, Old-sq.

Monmouthshire.—Capt. E. A. Somerset. C. O. S. Morgan, 9, Pall-mall

Monmouth Boroughs.—R. J. Blewitt, Reform-club

Montgomeryshire.—C. W. W. Wynn, 20, Grafton-street

Montgomery, &c.—D. Pugh, 1, Cork-st.

Morpeth.—Hon. E. G. Howard, 83, Eaton-place

Newark.—M. Sutton, A 6, Albany. J. Stuart, 19, Hertford-street

Newcastle-under-Lyne.—S. Christy, 2, Park-street. W. Jackson, 33, Bruton-street

Newcastle-upon-Tyne. — W. Ord, 17, Berkeley-square. T. E. Headlam, 30, Lincoln's-inn-fields

Newport, Isle of Wight.—C. W. Martin, 3, Suffolk-street. W. H. Plowden, 9, Devonshire-place

Norfolk, East.— H. N. Burroughes, Carlton-club. E. Wodehouse, Limmer's-hotel

Norfolk, West.—W. Bagge, Carlton-club. Hon. E. K. Coke, 1, St. James's-street

Northallerton.—W. B. Wrightson, 22, Upper Brook-street

Northampton.—R. V. Smith, 20, Saville-row. R. Currie, 4, Hyde-park-ter.

Northamptonshire, North.—T. P. Maunsell, Carlton-club. A. Stafford, 175, Piccadilly

Northamptonshire, South.—SirC.Knightly, Bart., 10, Upper Brook-street. R. H. A. Vyse, Knightsbridge-barracks

Northumberland.—Lord Ossulston, 17, South-street. Sir G. Grey, Bart., 14, Eaton-place

Northumberland, South.—M. Bell. S. C. H. Ogle, 26, Pall Mall

Norwich.—Marquis of Douro, 3, Upper Belgrave-st. S.M.Peto, 47, Russell-sq.

Nottingham. — J. Walter, 40, Upper Grosvenor-street. F. O'Connor

Nottinghamshire, North. — T. Houldsworth, 18, Suffolk-street. Lord H. Bentinck, 19, Cavendish-square

Nottinghamshire, South.—T. B. T. Hildyard, 45, Eaton-square. R. Bromley

Oldham.—W. J. Fox, 5, Charlotte-street. J. Duncuft, 3, Old Palace-yard

Oxford.—J. H. Langston, 143, Piccadilly. W. P. Wood, 12, Gt. George-st.

Oxfordshire.—Lord Norreys, 18, Grosvenor-street. G. Harcourt, 5, Carlton-house-terrace. J. Henley, 22, Great George-street

Oxford University.—Sir R. Inglis, Bart., 7, Bedford-place. Rt. Hon. W. Gladstone, 6, Carlton-gardens

Pembroke, &c.—Sir J. Owen, Bart., Arthur's-club

Pembrokeshire. — Viscount Emlyn, 3, Tilney-street

Penryn and Falmouth. — H. Gwynn, Carlton-club. F. Mowatt, 14, Devonshire-place

Peterborough.— Hon. G. Fitzwilliam, Halkin-st. W. G. Cavendish, Burlington-house

Petersfield.—Sir W. Jolliffe, Bart., Carlton-club

Plymouth. — Viscount Ebrington, 17, Grosvenor-square. R. Palmer, 11, New-square

Pontefract.—R. M. Milnes, 26, Pall Mall. S. Martin, 79, Eaton-place

Poole.—G. R. Phillips, 12, Hill-st. Rt. Hon. G. Robinson, 27, Chester-ter.

Portsmouth.—Rt. Hon. Sir F. T. Baring, Bart., Admiralty. Sir G. Staunton, Bart., 17, Devonshire-street

Preston.—C. P. Grenfell, 38, Belgrave-square. Sir G. Strickland, Bart., 123, Piccadilly

Radnor Boroughs.—Rt. Hon. Sir T. F. Lewis, 21, Grafton-street

Radnorshire.—Sir J. B. Walsh, Bart., 28, Berkeley-square

Reading.—F. Pigott, Reform-club. J. F. Stanford, 7, Langham-place

Reigate.—T. S. Cocks, 15, Hereford-street

Richmond.—H. Rich, 47, Mount-street. M. Wyvill, jun., Oxford and Cambridge-club

Ripon.—Sir J. Graham, Bart., 46, Grosvenor-pl. Hon. E. Lascelles, 4, Belgrave-square

Rochdale.—W. S. Crawford

Rochester.—R. Bernal, 93, Eaton-square. T. T. Hodges, 169, New Bond-street

Rutlandshire.—G. J. Heathcote, 12, Langham-place. Hon. G. Noel, 9, Cavendish-square

Rye.—H. B. Curteis, Fenton's-hotel

St. Alban's.—A. Raphael, 10, Great Stanhope-street. G. W. J. Repton, 66, Pall Mall

St. Ive's.—Lord W. Paulett, 19, Curzon-street

Salford.—J. Brotherton, 7, Manchester-buildings

Salisbury.—W. J. Chaplin, 1, Adelphi-terrace. C. B. Wall, 44, Berkeley-square

Sandwich.—Lord C. Paget, 1, Old Burlington-street. C. W. Grenfell, 38, Belgrave-square

Scarborough.—Sir J. Johnstone, Bart., 27, Grosvenor-sq. Earl Mulgrave, 56, Eaton-place

Shaftesbury.—R. B. Sheridan, 8, Chesterfield-street

Sheffield.—J. Parker, Admiralty. J. A. Roebuck

Shoreham, New.—Sir C. Burrell, Bart., 5, Richmond-terrace. C. Goring, 26, Pall Mall

Shrewsbury.—E. H. Baldock, 5, Hyde-park-place. R. A. Slaney, University-club

Shropshire, North.—W. O. Gore, 66, Portland-place. J. W. Dod, 37, Jermyn-street

Shropshire, South.—Hon. H. R. Clive, 53, Lower Grosvenor-st. Viscount Newport, 30, Wilton-crescent

Somersetshire, East.—W. Miles, 7, Hamilton-place. W. Pinney, 30, Berkeley-square

Somersetshire, West.—Sir A. Hood, Bart., 43, Wimpole-st. C. A. Moody

Southampton.—C. Cockburn, 3, Harcourt-buildings. B. M. Wilcox, 24, Dorset-square

South Shields.—J. T. Wawn, Reform-club

Southwark.—Ald. Humphrey, Hibernian-wharf. Sir W. Molesworth, Bart., 87, Eaton-place

Staffordshire, North.—C. B. Adderley, Carlton-club. Lord Brackley, 15 A, Hill-street

Staffordshire, South.—Hon. G. Anson, 25, Hill-street. Viscount Lewisham, 23, St. James's-square

Stafford.—D. Urquhart, 28, Clarges-st. Ald. Sidney, 8, Ludgate-hill

Stamford.—J. C. Herries, Carlton-club. Marquis of Granby, 102, Piccadilly

Stockport.—J. Kershaw, Free-trade-clb. J. Heald, 3, Old Palace-yard

Stoke-upon-Trent.—J. L. Ricardo, 31, Lowndes-square. Ald. Copeland, 160, New Bond-street

Stroud.—W. H. Stanton, Reform-club. G. P. Scrope, 13, Belgrave-square

Suffolk, East.—E. S. Gooch, 16, Lowndes-square. Lord Rendlesham, Travellers'-club

Suffolk, West.—P. Bennett, jun., 12, Eaton-place. H. S. Waddington, 45, St. James's-place

Sunderland.—Sir H. Williamson, Bart. G. Hudson, Albert-gate

Surrey, East.—Hon. P. J. L. King, 38, Dover-street. T. Alcock, 5, Lowndes-street

Surrey, West.—W. J. Evelyn. H. Drummond, 50, Chester-square

Sussex, East.—C. H. Frewen, 3, Old Palace-yard. A. E. Fuller, 16, Clifford-street

Sussex, West.—E. of March, 51, Portland-place. R. Prime

Swansea.—J. H. Vivian, 104, Eaton-sq.

Tamworth.—Sir R. Peel, Bart., White-hall-gardens. Captain Townsend, 4, Clarendon-place

Taunton.—H. Labouchere, 27, Belgrave-square. Sir T. Colebrooke, Bart., 18, Park-lane

Tavistock.—Hon. E. S. Russell, 3, Carlton-house-terrace. J. S. Trelawney, Reform-club

Tewkesbury.—J. Martin, 14, Berkeley-square. H. Brown, 2, Little Smith-street

Thetford.—Hon. F. Baring, 14, Pall Mall. Earl of Euston, 47, Clarges-street

Thirsk.—J. Bell

Tiverton.—J. Heathcoat, 5, Warwick-st. Viscount Palmerston, 4, Carlton-gar.

Totness.—Lord Seymour, 18, Spring-gardens. C. B. Baldwin, Union-club

Tower Hamlets.—Sir W. Clay, Bart., 17, Hertford-street. G. Thomson, 6 A, Waterloo-place

Truro.—J. E. Vivian, Batt's-hotel. H. Willyams, 46, Duke-street

Tynemouth.—R. W. Gray, 47, Belgrave-square

Wakefield.—G. Sandars

Wallingford.—W. S. Blackstone, Carlton-club
Walsall.—Hon. E. R. Littleton
Wareham.—J. Drax, King-street
Warrington.—G. Greenhall, 3, Old Palace-yard
Warwick.—W. Collins, 4, Pelham-cres. Sir C. E. Douglas, 27, Wilton-cres.
Warwickshire, North.—R. Spooner, 40, Duke-street. C. N. Newdegate, 3, Arlington-street
Warwickshire, South.—Lord Guernsey. Lord Brooke, 7, Carlton-gardens
Wells.—W. G. Hayter, 11, Hyde Park-terrace. R. Blackmore, 15, Regent-st.
Wenlock.—Hon. G. C. Forester, 21, Charles-street. J. M. Gaskell, 72, Lower Grosvenor-street
Westbury.—J. Wilson, 15, Hertford-st.
Westminster.—Sir De L. Evans, 26, Bryanstone-square. C. Lushington, 1, Palace-gardens
Westmoreland.—Col. Hon. H. Lowther, 31, Bruton-street. Ald. Thompson, 12, Whitehall-place
Weymouth.—Col. W. L. Freestun, Junior United Service Club. Hon. F. W. C. Villiers
Whitby.—R. Stephenson, 24, Gt. George-street
Whitehaven.—R.C. Hildyard, 9, Kensington-gore
Wigan.—R. A. Thickness. Hon. J. Lindsay, 21, Berkeley-square
Isle of Wight.—J. Simeon, 4, Eaton-pl.
Wilton.—Vis. Somerton, 3, Seamore-pl.
Wiltshire, North.—T. H. S. Sotherton, 51, Eaton-place. W. Long, 29, Hill-st.
Wiltshire, South.—Hon. S. Herbert, 5, Carlton-gardens. J. Bennett, Limmer's-hotel
Winchester.—Sir J. B. East, Bt., 117, Eaton-sq. I. B. Carter, 20, New-st.
Windsor.—Col. G. A. Reid, United University-club
Wolverhampton.—Hon. C. P. Villiers, Free Trade-club. T. Thornley, 24, Regent-street
Woodstock.—Marquis of Blandford, 3, Wilton-terrace
Worcester.—O. Ricardo, 71, Eaton-place. F. Rufford, 94, Pall Mall
Worcester, East.—Captain Rushout, Charles-street. J. H. H. Foley
Worcester, West.—Lt.-Gen. H. B. Lygon, 16, Grosvenor-place. F. W. Knight, 10, Dover-street
Wycombe.—G. H. Dashwood, 248, Oxford-street. M. T. Smith, 13, Upper Belgrave-street
Yarmouth.—J. Sanders, 4, St. James's-place. C. E. Rumbold
York.—J. G. Smyth, 17, Lowndes-sq. W. M. E. Milner, 75, Eaton-place
Yorkshire, East.—H. Broadley, 3, Charles-street. Lord Hotham, 7, Hill-street
Yorkshire, North.—E. S. Cayley. Hon. O. Duncombe
Yorkshire, West.—R. Cobden, 103, Westbourne-ter. E. Denison, 3, Hobart-pl.

IRELAND.

105 MEMBERS.

Antrim County.—N. Alexander, Cox's-hotel. Sir E. Macnaghten, 42, Upper Brook-street
Armagh.—Col. Rawdon, 3, Great Stanhope-street
Armagh County.—Col. J. Cauldfield, Brooke's-club. Sir W. Verner, Bart., 86, Eaton-square
Athlone.—W. Keogh, Carlton-club
Bandon Bridge.—Viscount Bernard
Belfast.—R. J. Tennent, Reform-club. Lord J. Chichester, 8, St. George's-pl.
Carlow.—J. Sadleir, D 4, Albany
Carlow County.—Col. H. Bruen, Carlton-club. W. B. Bunbury, Carlton-club
Carrickfergus.—Hon. W. H. S. Cotton, Carlton-club
Cashel.—Sir T. O'Brien, Bart., 14, Jermyn-street
Cavan County.—J. Young, 19, Chesham-pl. Hon. J. P. Maxwell, 46, Duke-st.
Clare County.—Maj. W. Macnamara, Jun. Uni. Service-club. Sir L. O'Brien, Bart., Reform-club
Clonmel.—Hon. C. Lawless
Coleraine.—Dr. J. Boyd, 2, Pall Mall
Cork.—W. Fagan. Col. Chatterton
Cork County.—E.B. Roche, Reform-club. Dr. M. Power
Donegal County.—Sir E. S. Hayes. T. Conolly, 19, Hanover-square
Down County.—Visc. Castlereagh, 25, Chesham-place. Lord E. Hill
Downpatrick.—R. Ker, 11, Upper Grosvenor-street
Drogheda.—Sir W. M. Somerville, 62, Lowndes-square
Dublin.—E. Grogan, Carlton-club. J. Reynolds
Dublin County.—J. H. Hamilton, Carlton-club. Lt.-Col. E. Taylor, Carlton-club
Dublin University.—J. Napier, 3, Old Palace-yard. G. A. Hamilton, Carlton-club
Dundalk.—W. T. M'Cullagh, 23, Cadogan-place
Dungannon.—Viscount Northland, 5, Bolton-row
Dungarvon.—R. L. Sheil, 73, Eccleston-square
Ennis.—O'Gorman Mahon
Enniskillen.—Hon. H. A. Cole, 5, John-street, Berkeley-square
Fermanagh.—Capt. M. Archdall, Carlton-club. Sir A. Brooke, Bt., Carlton-club
Galway.—M. J. Blake, Reform-club. A. O'Flaherty, 26, Grosvenor-street

Galway County.—Sir T. J. Burke, Bart., 112, Jermyn-street. C. St. George, Union-club
Kerry County.—H. A. Herbert, 3, Grosvenor-crescent. M. J. O'Connell
Kildare County.—Marq. of Kildare, 6, Carlton-house-terrace. Lord Naas
Kilkenny.—M. Sullivan, Queen's-hotel
Kilkenny County.—P. S. Butler, Delahay-street. J. Greene, 4, Charles-st.
King's County.—Sir A. Armstrong, Bt., Reform-club. Hon. J. Westerna, Brooke's-club
Kinsale.—B. Hawes, 9, Queen-street West
Leitrim County—E.K.Tenison,Brooke's-club. Hon. C. Clements, 2, Grosvenor-square
Limerick.—J. O'Connell, 1, Lower Grosvenor-street. J. O'Brien, Reform-club
Limerick County.—W. Monsell, 94, Eaton-square. S. Dickson
Lisburn.—Sir H. B. Seymour, 28, St. James's-place
Londonderry.—Sir R. A. Ferguson, Bt., United University-club
Londonderry County.—T.Bateson. Capt. T. Jones, 30, Charles-street
Longford County.—R. M. Fox. S. Blackall, jun., Junior United Service-club
Louth County.—R. M. Bellew, Brooke's-club. C. Fortescue, Alfred-club
Mallow.—Sir C. D. J. Norreys, Bart., Athenæum
Mayo County.—G. H. Moore, 9, Little Rider-st. R. D. Browne, Reform-club
Meath County.—H. Grattan, 6, Sackville-street. M. E. Corbally, 20, Regent-street
Monaghan County.—Hon. V. Dawson, 3, Great Stanhope-street. C. P. Leslie, 48, Berkeley-square
New Ross.—J. H. Talbot, Reform-club
Newry.—Viscount Newry and Morne, Carlton-club
Portarlington.—Colonel Dunne, Junior United Service-club
Queen's County.—J. W. Fitzpatrick, Clarendon-hotel. Hon. T. Vesey, 1, Grafton-street
Roscommon County.—F. French, 54, Parliament-street. O. D. Grace, Brooke's-club
Sligo.—J. P. Somers, Reform-club
Sligo County.—W. R. O. Gore, 66, Portland-place. J. Ffolliott, Carlton-club
Tipperary County.—N. R. Maher, Reform-club. F. Scully, Reform-club
Tralee.—M. O'Connell, Reform-club
Tyrone County.—Hon. H. T. L. Corry, 24, Grosvenor-square. Lord C. Hamilton, 19, Eaton-square
Waterford.—Sir H. W. Barron, 21, Cavendish-square. T. Meagher, Ford's-hotel
Waterford County.—N. M. Power, 80, Chester-square. R. Keating, 2, Bedford-row
Westmeath County.—Sir P. F. Nugent, Queen's-hotel. W. Magan, Army and Navy Club
Wexford.—J. T. Devereux, 93, Gloucester-place
Wexford County.—J. Fagan, 25, Craven-street. H. K. G. Morgan, 7, Lower Brook-street
Wicklow County.—Sir R. Howard, 17, Belgrave-square. Viscount Milton, 4, Grosvenor-square
Youghal.—T. C. Anstey, 4, Elm-court

SCOTLAND.
53 MEMBERS.

Aberdeen.—Capt. Fordyce, Cox's-hotel, Jermyn-street
Aberdeenshire.—Hon.W.Gordon,Argyle-house, Argyle-street
St. Andrew's.—E.Ellice, jun., 18, Arlington-street
Argyllshire.—Rt. Hon. D. M'Neill, Carlton-club
Ayr.—Lord P. C. Stuart, 6, Whitehall-pl.
Ayrshire.—A. Oswald, 14, Arlington-st.
Banffshire.—James Duff
Berwickshire.—Hon. Francis Scott, Carlton-club
Buteshire.—Hon. J. S. Wortley, 29, Berkeley-square
Caithness-shire.—G. Traill, Steven's-hotel, Bond-street
Clackmannanshire.—Maj.-Gen.Morison, 16, Saville-row
Dumbartonshire.—A. Smollett, 1, St. Alban's-place
Dumfries.—Wm. Ewart, 6, Cam.-square, Hyde-park
Dumfriesshire.—Visct. Drumlanrig, 2, George-street
Dundee.—G. Duncan, 6, Belgrave-st., South
Edinburgh.—W. G. Craig, 22, Lowndes-square. C. Cowan, 45, Upper Thames-street
Edinburghshire. — Sir J. Hope, 1, St. Alban's-place
Elgin.—G. S. Duff, 130, Piccadilly
Elginshire. — C. L. C. Bruce, 1, St. Alban's place
Falkirk.—Earl of Lincoln
Fifeshire.—I. Fergus, 11, Hereford-st.
Forfarshire. — Ld. J. F. Hallyburton, Kensington-palace
Glasgow. — J. MacGregor, Ennismore-terrace. A. Hastie
Greenock.—Lord Melgund, 48, Eaton-sq.
Haddington.—Sir H. R. Davie, 48, Wilton-crescent
Haddingtonshire.—Hon. F. Charteris, 27, Chesham-street

Inverness-shire.—H. J. Baillie, jun., 1, Seamore-place
Inverness.—A. Matheson, Orient. and Ref. clubs
Kilmarnock.—Hon. E. P. Bouverie, 19, Chester-street
Kincardineshire. — Hon. Lt.-Gen. Arbuthnot, 5 H, Albany
Kirkaldy. — Lieut.-Colonel Ferguson, Brooke's-club
Kircudbright.—J. Macgall
Lanarkshire. — W. Lockhart, Carlton-club
Leith.—Rt. Hon. A. Rutherford, Gwydir-house
Linlithgowshire.—G. Dundas, 26, Pall Mall
Montrose.—J. Hume, 6, Bryanstone-sq.
Orkney and Shetland. — A. Anderson, 122, Leadenhall-street
Paisley.—A. Hastie, 5, Rutland-gate
Peeblesshire.—W. F. Mackenzie, Carlton-club
Perth.—Rt. Hon. F. Maule, 38, Lower Grosvenor-street
Perthshire.—H. H. Drummond, Carlton-club
Renfrewshire.—Col. Mure
Ross and Cromarty.—J. Matheson, 13, Cleveland-row
Roxburghshire.—Hon. J. E. Elliott, 41, Wilton-crescent
Selkirkshire.—A. E. Lockhart, Carlton-club
Stirling.—J. B. Smith, 105, Westbourne-terrace
Stirlingshire.—W. Forbes, Carlton-club
Sutherlandshire. — Sir D. Dundas, 13, King's-bench-walk
Wick.—J. Loch, 12, Albemarle-street
Wigton.—Sir J. M'Taggart, Portland-club
Wigtonshire.—Capt. J. Dalrymple, 30, Albemarle-street

CLERKS AND OFFICERS OF BOTH HOUSES OF PARLIAMENT.

PEERS.

Speaker.—Ld. Cottenham (Ld. Chancel.)
Speakers by Royal Com.—Earl of Shaftesbury (Chairman of Committee), Lord Denman
Gent. Usher of Black Rod.—Sir A. W. Clifford, Bart.
Serj. at Arms.—Lt.-Col. A. Perceval
Clerk of Parl.—Rt. Hon. Sir G. H. Rose
Clerk Assist.—J. G. S. Lefevre
Add. Clerk Assist.—W. Rose
Reading Clerk and Clerk of Priv. Com.—L. Edmunds
Counsel to Chairman of Com.—R. Palk
Clerk of Journals.—Edward Parratt
Chief Clerk.—H. S. Smith
Librarian.—J. F. Leary

COMMONS.

Serj. at Arms.—Lord C. J. F. Russell
Chief Clerk.—J. H. Ley
Clerk Assistant.—W. Ley
Chaplain.—Rev. T. Garnier
Librarian.—T. Vardon, Ass. Hon. G. Waldegrave
Sec. to Speak.—C. E. Lefroy

HER MAJESTY'S CHIEF OFFICERS OF STATE.

First Lord of the Treasury	Right Hon. Lord J. Russell
Lord High Chancellor	Right Hon. Lord Cottenham
Chancellor of the Exchequer	Right Hon. Sir C. Wood, Bart.
Lord President of the Council	Right Hon. Marquis of Lansdowne
Lord Privy Seal	Right Hon. Earl Minto
Secretary of State, Home Department..	Right Hon. Sir G. Grey, Bart.
Secretary of State, Foreign Affairs ..	Right Hon. Viscount Palmerston
Secretary of State for the Colonies ..	Right Hon. Earl Grey
First Lord of the Admiralty	Right Hon. F. T. Baring
President of the Board of Control ..	Right Hon. Sir J. C. Hobhouse, Bart.
President of the Board of Trade.. ..	Right Hon. H. Labouchere
Paymaster-General	Right Hon. Earl Granville
Postmaster-General	Right Hon. Marquis of Clanricarde
First Commissioner of Woods & Forests..	Right Hon. Lord Seymour
Chancellor of the Duchy of Lancaster ..	Right Hon. Earl Carlisle

The above form the Cabinet.

Commander-in-Chief	His Grace the Duke of Wellington
Secretary at War	Right Hon. F. Maule
Master-General of the Ordnance.. ..	Marquis of Anglesey
Master of the Mint	Right Hon. R. L. Shiel, M.P.
Advocate-General	Right Hon. Sir D. Dundas
Secretary to Board of Control	James Wilson, M.P.
Surveyor-General of the Ordnance ..	Maj.-Gen. C. R. Fox
Clerk of the Ordnance	Col. Hon. G. Anson, M.P.
Storekeeper of the Ordnance	Capt. Sir T. Hastings
Under Secretary of State, Colonies ..	B. Hawes, M.P.
Under Secretary of State, Foreign ..	Lord Eddisbury
Under Secretary of State, Home.. ..	H. Waddington
Joint Secretaries to Treasury	Rt. Hon. W. C. Hayter; H. Tuffnell
Secretary to the Admiralty	J. Parker, M.P.
Attorney-General	Sir J. Jervis, M.P.
Solicitor-General	Sir J. Romilly, M.P.
Lord Lieutenant of Ireland	Right Hon. the Earl of Clarendon
Chief Secretary	Sir W. M. Somerville, Bart.
Lord Chancellor	Right Hon. M. Brady
Lord Advocate for Scotland	Right Hon. A. Rutherfurd, M.P.
Solicitor-General....	

TREASURY.

Lords Commissioners.—Rt. Hon. Lord J. Russell; Rt. Hon. Sir C. Wood, Bt.; R. M. Bellew; H. Rich; W. G. Craig
Joint Secs.—H. Tuffnell; W. C. Hayter
Principal Clerk.—S. R. M. Leake
Solicitor.—G. Maule
Accountant.—J. Miller

PRIVY COUNCIL.

Clerks in Ord.—C. C. F. Greville; Hon. W. Bathurst
Chief Clerk.—J. B. Lennard
Appeal Clerk.—H. Reeve
Clk. for Cler. Returns.—Rev. W. Harness, M.A.

EXCHEQUER.

Comptroller.—Lord Monteagle
Chief Clerk.—F. P. Ottey
Accountant.—G. F. Froderick

COLONIAL OFFICE.

Under Secs.—B. Hawes; H. Merrivale, T. F. Elliott, *Assistant*
Chief Clerk.—P. Smith

FOREIGN OFFICE.

Under Secs.—Lord Eddisbury; H. W. Addington
Chief Clerk.—G. L. Conyngham

WOODS AND FORESTS.

Commissioners.—Rt. Hon. Earl of Carlisle; A. Milne; Hon. C. A. Gore
Chief Clerks.—G. Cornell; J. Burke

BOARD OF TRADE.

Vice-Pres.—Earl Granville
Direct. Statis. Dep.—A. Fonblanque; *Deputies*—W. D. Oswald, R. Valpy
Secs.—G. R. Porter; Sir D. le Marchant, Bt.

BOARD OF CONTROL.

Pres.—Sir J. C. Hobhouse
Secs.—Hon. J. E. Elliott; J. Wilson

HOME OFFICE.

Und. Secs.—H. Waddington; G. C. Lewis
Chief Clerk.—H. J. Knyvett

QUEEN'S MINT.

Mast. Work.—R. L. Sheil
Comptroller.—J. Tekell
Chief Medallist.—B. Pistrucci
Assayer.—H. Bingley

STATE PAPER OFFICE.

Keeper.—Right Hon. H. Hobhouse
Chief Clerk.—R. Lemon

CUSTOMS.

Commissioners.—Sir T. F. Fremantle, Bart. (Chairman); Rt. Hon. G. Dawson (Dep. Chairman); H. Richmond; S. G. Lushington; C. C. Smith; Hon. S. E. S. Rice; F. Goulbourn; T. P. Dickinson; Capt. Saurin
Sec.—C. A. Scovell
Surv.-Gen.—A. Ross; B. Jennings; C. Boyd; T. Howe
Inspec.-Gen.—W. Irving

INLAND REVENUE.

EXCISE.

Commissioners.—J. Wood (Chairman); H. Davis (Dep. Chairman); T. Harrison; H. F. Stephenson; C. J. Herries; C. P. Rushworth; A. Montgomery; C. P. Pressly
Sec.—J. C. Freeling

STAMPS AND TAXES.

Chief Clerk—T. Sargent
Solicitor.—J. Timms

IRISH OFFICE.

Chief Sec.—Sir W. Somerville, Bart.
Chief Clerk.—G. Trundle

RAILWAY COMMISSION.

Commissioners.—Rt. Hon. H. Labouchere (Chairman); Earl Granville; Rt. Hon. Sir E. Ryan
Sec.—Capt. Harness, R.E.
Regist.—D. M'Gregor

GENERAL REGISTER OFFICE.

Reg.-Gen.—G. Graham
Chief Clerk.—T. Mann
First Clerk of Records.—E. Edwards

DUCHY OF CORNWALL.

THE PRINCE OF WALES'S COUNCIL.

His Royal Highness Prince Albert, K.G.
The Earl of Lincoln
The Right Hon. T. P. Leigh
Right Hon. the Earl of Carlisle
Lord Portman
Sec.—J. R. Gardiner

OFFICERS.

Lord Warden of Stan. & Chief Stew. of Duchy in Cornwall & Devon.—H.R.H. Prince Albert
Sec. to L. W. & Keep. of Rec. of Duchy.—J. R. Gardiner
Chanc. & Keep. of Gt. Seal.—The Right Hon. T. P. Leigh
Surv.-Gen.—J. R. Gardiner
Auditor.—E. White
Rec.—J. W. Bateman
Dep.-Rec.—B. Tucker
Att.-Gen.—The Hon. J. C. Talbot, Q.C.
Sol.-Gen.—E. Smirke
Vice-Warden.—J. L. Dampier
Sheriff of Cornwall.—Sir Samuel Thomas Spry
Surv. of Land & Min. in Cornw. & Devon.—R. Taylor
Surv. of Lands in Somerset, Dorset, & Wilts.—R. Watt
Mineral Agent.—R. Taylor
Rang. & Mast.-Forest. of F. of Dartmoor.—H.R.H. Prince Albert, K.G.

DUCHY OF LANCASTER.

Chanc.—The Right Hon. Earl of Carlisle
Att.-Gen.—T. F. Ellis
Rec.-Gen.—Major-Gen. C. R. Fox, M.P.
Auditor.—J. G. Lockhart
Clerk of Coun. & Regist.—F. D. Danvers

COMMITTEE OF PRIVY COUNCIL FOR TRADE.

Pres.—Rt. Hon. the Earl of Clarendon, G.C.B.
Vice-Pres.—Rt. Hon. Earl Granville
Committee.—Lord Chancellor, First Lord of the Admiralty, the Principal Secretaries of State, Chancellor of the Exchequer, Speaker of the House of Commons, Chancellor of the Duchy of Lancaster, Paymaster-General, Master of the Mint, those Officers of State in Ireland who are Privy Councillors in England, Bishop of London
Joint Secs.—George R. Porter; Sir Dennis le Marchant

PRIVY SEAL OFFICE.

Lord Privy Seal.—The Right Hon. the Earl Minto, G.C.B.
Patent Clerks.—J. G. Donne; R. Eden
Clerk.—W. Goodwin
Keep. of Rec. & Receiv. of Fees.—R. Eden

PUBLIC WORKS LOAN OFFICE.

Acts 57 Geo. III., cap. 34 & 124—3 Geo. IV., cap. 86—1 & 2 Wm. IV., cap. 24—4 & 5 Wm. IV., cap. 72—1 Vict., cap. 51—1 & 2 Vict., cap. 88, & 3 Vict., cap. 10—5 Vict., Sess. 2, cap. 9.
Chairman.—B. Harrison
Dep. Chairman.—G. Hathorn
C. Bosanquet; Earl Fortescue, P.C.; Visc. Melbourne; Sir T. D. Acland,

Bart., M.P.; Sir T. S. Gooch, Bart.; Lord Hatherton, P.C.; T. G. B. Estcourt, M.P.; W. W. Whitemore; J. Loch; H. Warburton, M.P.; Sir B. Heywood, Bart.; Right Hon. H. Labouchere, M.P.; J. Thornton; J. Berens; S. M. Phillips; A. Colville; J. Olive; J. Reid; N. Garry; Sir J. H. Pelly, Bart.; J. H. Palmer; A. G. Robarts, jun.; T. Baring, M.P.; G. W. Norman; G. C. Glyn; S. J. Loyd; W. Ward; H. A. Harrison

Sec.—J. S. Brickwood

PUBLIC RECORD OFFICE.

Head Office.—Rolls-house, Chancery-la.

Branch Office.—Rolls chapel, Rolls-yd.; Tower; Chapter-house, Poets'Corner; and Carlton-ride. Office hours, 10 to 4.

Keep. & Custos of Rec.—The Master of the Rolls

Dep.-Keep.—Sir F. Palgrave, K.H.

Sec.—F. S. Thomas

COLONIAL LAND AND EMIGRATION BOARD.

Commissioners.—T. W. C. Murdock; C. A. Wood; F. Rogers

Sec.—S. Walcot

ENCLOSURE COMMISSIONERS FOR ENGLAND & WALES.

Chief Com.—Rt. Hon. Earl of Carlisle

Comms.—G. Darby; W. Blamire

Sec.—H. C. Mules

ECCLESIASTICAL COMMISSIONERS FOR ENGLAND.

The Archbishops and Bishops of England and Wales; the Lord Chancellor; First Lord of the Treasury; President of the Council; Secretary of State for the Home Department and Chancellor of the Exchequer; the Lord Chief Justices of England; the Master of the Rolls; the Lord Chief Justice of the Common Pleas, Lord Chief Baron, and the Judges of the Prerogative and Admiralty Courts; the Deans of Canterbury, St. Paul's, and Westminster; the Earls of Devon and Chichester; Right Hon. H. Goulburn, the Right Hon. H. Hobhouse; Right Hon. J. R. G. Graham, Bart., M.P.; J. G. S. Lefevre; J. Nicholl, D.C.L., M.P.

Treas. & Secs.—(Vacant).

Solicitors.—Messrs. J. Meadows White & J. Murray

Assist.-Sec.—J. J. Chalk

Architect.—W. Railton

Survs.—Messrs. R. Cluton, J. Pickering, & Smith

Aud. & Act.—A. Morgan

Accountant.—B. R. Aston

Office-Keep. & Mess.—J. Bubb

EASTLAND COMPANY.

Governor.—S. Thornton

Dep.-Gov.—J. Cattley

Treas.—Hon. J. T. L. Melville

Sec.—T. Cope

COMMISSIONERS FOR PROMOTING THE FINE ARTS.

Commissioners.—H.R.H. Prince Albert, K.G.; Right Hon. Lord Lyndhurst; Right Hon. Duke of Sutherland, K.G.; Right Hon. Marquis of Lansdowne, K.G.; Right Hon. Earl of Lincoln, M.P.; Earl of Shrewsbury; Right Hon. Earl of Aberdeen, K.T.; Right Hon. Viscount Canning; Right Hon. Lord J. Russell, M.P.; Right Hon. Earl of Ellesmere; Right Hon. Earl of Carlisle; Right Hon. Viscount Palmerston, M.P.; Viscount Mahon, M.P.; Lord W. de Eresby; Lord Colborne; Right Hon. C. S. Lefevre, M.P.; Right Hon. Sir R. Peel, Bart., M.P., P.C.; Right Hon. Sir J. R. G. Graham, Bart, M.P., P.C.; Sir R. H. Inglis, Bart., M.P.; Right Hon. T. B. Macaulay, M.P.; B. Hawes, jun., M.P.; H. Hallam, F.R.S.; S. Rogers, F.R.S.; G. Vivian; T. Wyse

Sec.—C. L. Eastlake, R.A.

OFFICE OF REGISTRAR OF DESIGNS.

Regist.—C. Johnson

Assist.-Regist.—Hon. E. C. Curzon

Clerk.—J. H. Bowen

Second Clerk.—H. C. Woollett

Office-Keeper.—C. Tristom

Mess.—J. Pastell

POST OFFICE (General).

Postmaster-Gen. for U. Kingdom.—The Most Noble U. J. Marquis of Clanricarde, K.P.

Sec.—Lieut.-Col. W. L. Maberley

Sec. to Postm.-Gen.—R. Hill

Assist. Sec.—J. Tilley

Inspect.-Gen.—J. Ramsey

Priv. Sec. to Postm.-Gen.—G. C. Cornwall

Chief Clerk to Sec.—C. Johnson

AUDIT OFFICE FOR PUBLIC ACCOUNTS.

Commissioners.—Col. Sir W. L. Herries, C.B., K.C.H. (Chairman); H. F. Luttrell; H. Arbuthnott; E. Romilly; Sir A. G. Grant, Bart.; C. Ross; R. V. Davies.

Sec.—R. M. Bromley

ADMIRALTY.

Commissioners.—Sir F. Baring, Admiral Dundas, Adm. Berkeley, Capt. Milne, Hon. W. Cowper

Secretaries.—J. Parker, Capt. W. A. Hamilton

Hydrographer.—Rear-Adm. Sir F. Beaufort

ARCHITECTURAL AND ENGINEERING WORKS.

Director.—Lieut.-Col. A. Irvine, C.B.
Chief Assist.—W. Scamp

WAR-OFFICE.

Commander-in-Chief.—D. of Wellington
Sec. to Com.-in-Chief. — Lord Fitzroy Somerset
Secretary at War.—Hon. F. Maule
Dep.—L. Sullivan

ROYAL OBSERVATORY, GREENWICH.

Astron. Royal & Sup. of Chronometers.—G. B. Airy, M.A., F.R.S.
First Assist.—Rev. R. Main, M.A.
Sup. of Naut. Almanack.—Lieut. W. S. Stratford, R.N.

SOUTH-SEA COMPANY.

Governor.—C. Bosanquet
Sub-Gov.—C. Franks
Dep.-Gov.—Hon. P. P. Bouverie
Cashier.—J. T. Viner
Sec.—C. F. Gibson
Accountant.—W. R. Arnold

COMMISSIONERS FOR THE REGISTRATION AND REGULATION OF COAL-WHIPPERS IN THE PORT OF LONDON.

[Under the Act 9 & 10 Vict., c. 36.]

Commiss. app. by Lords of Com. of Privy Coun. for Trade.—C. Green (Chairman); R. Gamman; V. H. Hobart; T. Wood
Commiss. app. by Com. Counc. of City of London.—T. Pewtress (Vice-Chair.); J. Dixon; G. Stacey; T. Snelling
Commiss. in Term. of Act.—G. F. Young
Regist.—J. Barber

INCORPORATED LAW SOCIETY.

Pres.—B. Austen
Vice-Pres.—T. Clarke
Sec.—R. Maughan

SOCIETY FOR PROTECTION OF AGRICULTURE.

Pres.—The Duke of Richmond
Vice-Pres.—The Duke of Buckingham
Sec.—H. Dyson

DIRECTORS OF THE EAST-INDIA COMPANY, 1850.

John Shepherd, *Chairman.* Sir J. W. Hogg, Bart., M.P., *Dep. Chairman.*

W. Wigram
Sir R. Campbell, Bart.
J. Masterman, M.P.
J. P. Muspratt
H. Alexander
Lt.-Gen. Sir J. L. Lushington, G.C.B.
G. Lyall
R. Ellice
Sir R. Jenkins, G.C.B.
W. B. Bayley
F. Warden
Sir H. Willock, K.L.S.
M. T. Smith, M.P.
Lieut.-Col. W. H. Sykes
E. Macnaghten
Major J. Oliphant
J. C. Whiteman
The Hon. W. H. L. Melville
R. D. Mangles, M.P.
Major-Gen. J. Caulfeild, C.B.
W. J. Eastwick
Major J. A. Moore

The following gentlemen are out by rotation:—J. Cotton; J. Loch; C. Mills; W. H. C. Plowden, M.P.; H. Shank; H. St. G. Tucker.

GOVERNORS AND DIRECTORS OF THE BANK OF ENGLAND.

Governor.—H. J. Prescott. *Dep.-Gov.*—Thomas Hankey.

H. H. Berens
A. E. Campbell
E. H. Chapman
W. Cotton
R. W. Crawford
B. Dobree
B. D. Greene
C. P. Grenfell
J. O. Hanson
J. B. Heath
K. D. Hodgson
H. L. Holland
J. G. Hubbard
T. N. Hunt
C. F. Hutt
A. Lathan
J. Malcolmson
J. Morris
S. Neave
G. W. Norman
J. H. Palmer
Sir J. H. Pelly, Bt.
W. Thompson, Ald.
T. Tooke, jun.

Sec.—J. Knight. *Chief Accountant.*—W. Smee.

LONDON BANKERS.

Agra and United Service Bank, 15, Old Jewry-chambers
Bank of Australasia, 8, Austin Friars
Bank of Australia, 2, Moorgate-street
Bank of Ceylon, 32, New Bond-street
Bank of British North America, 7, St. Helen's
Bank of England
Barclay, Bevan, Tritton, & Co., 54, Lombard-street
Barnard, Dimsdale, & Co., 50, Cornhill
Barnett, Hoare, Hoare, & Bradshaw, 62, Lombard-street
Biggerstaff, W. & J. S., West Smithfield
Bosanquet, Anderson, Franks, & Co., 73, Lombard-street
Bouverie & Co., 11, Haymarket
British Colonial Bank and Loan Comp., 50, Moorgate-street
Brown, Janson, & Co., 32, Abchurch-la.
Bult, Son, & Co., 85 & 86, Cheapside
Call, Sir W. P., Bart., Martin, & Co., 25, Old Bond-street
Child & Co., 1, Fleet-street
Cocks, Biddulph, & Biddulph, 43, Charing-cross
Cockburn & Co., 4, Whitehall
Colonial Bank, 13, Bishopsgate-st.-within
Commercial Bank of London, Lothbury
Coutts & Co., 59, Strand
Cunliffe, Roger, 24, Bucklersbury
Cunliffes, Brooks, & Co., 29, Lombard-st.
Curries & Co., 29, Cornhill
Davies, R., & Co., 187, Shoreditch
Dixon, Brooks, & Dixon, 25, Chancery-lane
Denison, Heywood, & Co., 4, Lombard-street
Drewett & Fowler, 4, Princes-st., Bank
Drummond & Co., 49, Charing-cross
Feltham, J., & Co., 42, Lombard-street
Fuller & Co., 66, Moorgate-street
Glyn, Sir R. C., & Co., 67, Lombard-st.
Goslings & Co., 19, Fleet-street
Hanbury, Taylor, & Lloyd, 60, Lombard-street
Hankey & Co., 7, Fenchurch-street
Herries, Farquhar, & Co., 16, St. James's-street
Hill & Sons, 17, West Smithfield
Hoare, Messrs., 37, Fleet-street
Hopkinson & Co., 3, Regent-st., Waterloo-place
Ionian Bank, 6, Great Winchester-st.
Johnston, H. & J., & Co., 15, Bush-lane, Cannon-street
Jones, Loyd, & Co., 43, Lothbury
London & County Joint Stock Banking Co., 21, Lombard-street
London Joint Stock Bank, 5, Princes-st., Bank; 69, Pall Mall
London & Westminster Bank, 38, Lothbury; St. James's-square; 213 & 214, High Holborn; Wellington-street, Borough; 87, High-street, Whitechapel; 4, Stratford-place
Lubbock, Sir J. W., Bart., & Co., 11, Mansion-house-street
Martin, Stone, Martin, & Co., 68, Lombard-street
Masterman, Peters, & Co., 35, Nicholas-lane
National Bank of Ireland, 13, Old Broad-street
National Provincial Bank of England, 112, Bishopsgate-street-within
North-Western Bank of India, 19, King's Arms-yard, Moorgate-street
Oriental, 7, Walbrook
Pocklington & Lacey, 60, W. Smithfield
Praed, Fane, Praed, Johnstone, & Co., 189, Fleet-street
Prescott, Grote, & Co., 62, Threadneedle-street
Price, Sir C., Bart., & Co., 3, King William-street
Provincial Bank of Ireland, 42, Broad-st.
Puget, Bainbridge, & Co., St. Paul's-churchyard
Ransom & Co., 1, Pall Mall East
Robarts, Curtis, & Co., 15, Lombard-st.
Rogers, Olding, & Co., 29, Clement's-la.
Royal Bank of Australia, 2, Moorgate-st.
Sapte, Banbury, Muspratt, & Co., 77, Lombard-street
Scott, Sir S., Bart., & Co., 1, Cavendish-square
Shank, J., 76, West Smithfield
Smith, Payne, & Smith, 1, Lombard-street
South Australian Banking Co., 54, Old Broad-street
Spooner, Attwoods, & Co., 27, Gracechurch-street
Stevenson, Salt, & Sons, 20, Lombard-street
Stride, J. & W. S., 41, West Smithfield
Strahan, W. & P., Sir J. D., Bart., Temple-bar-without, 217, Strand
Tisdall, T. G., 15, West Smithfield
Twining, R. G., J. A., & R., 215, Strand
Union Bank of Australia
Union Bank of London, 2, Princes-st., Bank; Argyll-place; 4, Pall Mall East
Williams, Deacon, Labouchere, & Co., 20, Birchin-lane
Willis, Percival, & Co., 76, Lombard-st.

CITY OFFICES.

Lord Mayor.

The Right Hon. T. Farncomb...... 1840

Sheriffs.

D. Nicoll; W. Laurence

Under Sheriffs.

T. Millward; D. W. Wire.

Aldermen.

The following have not passed the Chair.

	Chosen
Musgrove, J., 18, Old Broad-st.	1842
Hunter, W., 10, Finsbury-circus	1843
Challis, T., 32, Wilson-street	1843
Sidney, T., M.P., 8, Ludgate-hill	1844
Moon, F. G., 20, Threadneedle-st.	1844
Salomons, D., 1, Shorter's-court	1848
Finnis, T. Q., Tower-street	1848
Lawrence, W., 30, Bread-street	1848
Carden, R. W., 2, Exchange-bldgs.	1849

The following have passed the Chair.

	Chosen
Hunter, Sir C. S., Bart., 23, Euston-sq.	1804
Thompson, W., M.P., Up. Thames-st.	1821
Key, Sir J., Bart., 3, Abchurch-la.	1823
Laurie, Sir P., Kt., 7, Park-square	1826
Farebrother, C., 6, Lancaster-place	1826
Copeland, W., M.P., 37, Linc.-inn-fld.	1830
Kelly, T., 17, Paternoster-row	1830
Wilson, S., 24, St. Paul's-churchyd.	1831
Marshall, Sir C., Kt., 43, Russell-sq.	1832
Pirie, Sir J., Bart., Birchin-lane	1834
Humphery, J., M.P., Hay's-wharf.	1835
Magnay, Sir W., Bart., College-hill	1838
Gibbs, M., 33, Walbrook	1838
Carroll, Sir G., 34, Cavendish-sq.	1840
Hooper, J. K.	1840
Duke, Sir J., M.P.	1840

Recorder.—Hon. C. E. Law.
Chamberlain.—A. Browne.

Town Clerk.—Serjt. Merewether.
Common Serjeant.—J. Bullock.

BRITISH AND FOREIGN AMBASSADORS.

Country.	*British Ministers abroad.*	*Secretaries of Legation.*	*Foreign Ambassadors.*	*Secretaries of Legation.*
America....	Hon. Sir H. Bulwer	J. F. Crampton.	A. Lawrence.	J. C. Davis
Austria	Visc. Ponsonby.	A. C. Magenis.	Baron Koller.	Ct. Colleredo
Bavaria	J. B. Milbanke.	A. G. Bonar.	Baron de Cetto.	
Belgium....	Ld. H. de Walden.	T. W. Waller.	S. Van de Weyer.	C. Drouet
Brazil......	Lord Howden.	J. Hudson.	Marq. de Lisboa.	A. de Paiva
Denmark ..	Rt. Hon. H. W. W. Wynn.	P. Browne.	Ct. de Reventlow.	M. Bielke
France	Marq. Normanby.		M. Drouyhn de [l'Huys.	
Germn. Con.	Lord Cowley.			
Greece	Mr. T. Wyse.	P. Griffith.		
Hanseatic T.	G. L. Hodges.		J. Colquhoun.	[mann
Hanover ..	Hon. J. D. Bligh.	Hn. G. Edgcumbe	Ct. Kielmansegge	C. Klinge-
Mexico	C. Bankhead.	P. W. Doyle.	Don J. M. Mora.	DnJM'ndoza
Netherlands	Sir E. Disbrowe.	Hon. H. Elliott.	Ct. Schimmel-penninck.	J. L. A. Stra- [tenus
N. Granada	D. F. O'Leary.		M. M. Mosquera.	DnRdeAlaya
Portugal ..	Sir G. Seymour.	Hn. H. G. Howard	Vis. de Moncorvo.	CvM. Ribeiro
Prussia	E. of Westmorland.	H. F. Howard.	Chev. Bunsen.	C. P. Seidli-
La Plata....	H. Southern.	F. L. Hall.	Don M. Moreno.	[nitzi
Russia	Lord Bloomfield.	A. Buchanan.	B. de Brunnow.	Ct. de Berg
Sardinia....	Hn. R. Abercrombie	Hon. R. Bingham	Baron d'Isola.	M. de Azeglio
Saxony	Hon. F. Forbes.	C. T. Barnard.		
Sicilies, Two	Hon. W. Temple.	Lord Napier.	Pr. Castelcicala.	Sig. Conofar.
Spain				
Sweden		G. R. Gordon.	Baron Rehausen.	G. Sibbern.
Switzerland	Sir E. Lyons.	R. Peel.		
Turkey	Sir S. Canning.	Hn. G. Jerningham.	Pr. Callimaki.	
Tuscany....	Sir G. B. Hamilton.	Hn. P. C. Scarlett.		
Wurtembrg.	Sir A. Malet.	A. Craven.		

COLONIAL GOVERNORS.

Colony.	*Governor.*	*Secretary.*
Canada	Rt. Hon. Earl of Elgin and Kincardine	Lt.-Col. Hon. R. Bruce
Nova Scotia	Lt.-Gen. Sir J. Harvey, K.C.B.	Capt. Thos. Bourke
New Brunswick	Sir E. W. Head, Bart.	G. Botsford
Pr. Edward's Island	Sir D. Campbell, Bart.	T. H. Haviland
Newfoundland	Sir J. G. le Marchant	J. Crowdey
Barbadoes	Colonel Sir W. M. G. Colebrooke	J. Walker
Grenada	Ker B. Hamilton	O. Rowley
St. Vincent	Sir J. Campbell, Bart.	J. Beresford
Tobago	Major L. Græme	J. Thornton
St. Lucia	C. H. Darling	W. Hanley
Trinidad	Lord Harris	A. White
Antigua	J. M. Higginson	T. Lane
Montserrat	E. D. Baynes	H. Loving
Nevis	W. Shortland	T. Slater
St. Kitt's	R. J. Mackintosh	R. M. Rumsey
Dominica	Lieut.-Col. G. Macdonald	W. A. McCoy
Jamaica	Rt. Hon. Sir C. E. Grey	W. G. Stewart
Heligoland	Capt. J. Hindmarsh, R.N.	
Honduras	Col. Fancourt	G. C. Berkeley
British Guiana	H. Barkley	W. Walker
Bahamas	J. Gregory	C. R. Nesbit
Bermuda	Capt. C. Elliott, R.N.	R. Kennedy
Cape of Good Hope	Maj.-Gen. Sir H. Smith	Capt. Maydwell
Ceylon	Viscount Torrington	Sir J. E. Tennant
Gibraltar	Sir R. W. Gardiner	G. Adderley
Hong Kong	S. G. Bonham	Major W. Caine
Malta	R. M. O'Ferral	H. Lushington
Mauritius	Sir G. W. Anderson	C. E. Macaulay
New South Wales	Sir C. A. Fitzroy	E. D. Thomson
St. Helena	Maj.-Gen. Sir P. Ross, G.C.M.G., K.C.H.	R. C. Pennell
Sierra Leone	N. W. Macdownell	W. Ferguson
River Gambia	R. G. Macdonel	T. L. Ingram
Van Diemen's Land	Capt. Sir W. T. Denison, R.E.	J. E. Bicheno
West Australia	C. Fitzgerald	A. R. Madden
South Australia	Sir H. E. F. Young	Capt. C. Sturt
New Zealand	Sir G. Grey	Dr. Sinclair
Falkland Islands	G. Rennie	
Ionian Islands	Sir H. G. Ward	J. Fraser

Virgin Island.—E. H. D. Hay
Labuan.—Sir J. Brooke
Gold Coast.—Sir W. Winniett
Natal.—M. West

PASSPORT AND CONSULAR OFFICES.

Austria.—Embassy, 7, Chandos-street
Baden.—Consul's-office, 1, Riches-ct.
Bavaria.—33½, Great St. Helen's
Belgium.—Consul's-office, 3, Copthall-ct.
Brazil.—41, York-street, Portman-sq.
Denmark.—Consul's-of., 6, Warnford-ct.
Equador Straits.—10, Old Jewry-cham.
France.—Consul's-of., 3, Copthall-bldgs.
Frankfort.—12, Broad-street-buildings
Greece.—Consul's-of., 25, Finsbury-circ.
Hanover.—Embassy, 44, Grosvenor-pl.
Hanseatic Towns.—Consul's-office, 3, Hare-court, Temple
Hesse.—106, Fenchurch-street
La Plata.—27, New Broad-street
Mecklenburg.—Consul's-of., 9, Billiter-street
Mexico.—6, Arundel-street, Haymarket
Naples and Sicily.—15, Princes-street, Cavendish-square
Netherlands.—Consul's-of., 123, Fenchurch-street
New Granada.—3, Winchester-bldgs.
Oldenburg.—Consul's-office, 3, Hare-court, Temple
Peru.—6, Copthall-court
Portugal.—Consul's-of., 5, Jefferey-sq.
Prussia.—Consul's-office, 106, Fenchurch-street
Russia.—Consul's-office, 2, Winchester-buildings
Sardinia.—Consul's-of., 31, Old Jewry
Saxony.—3, Hare-court, Temple
Sicilies, the Two.—5, Princes-street, Cavendish-square
Spain.—Consul's-office, 37, Old Broad-st.
Sweden and Norway.—14, Halkin-st., Belgrave-square
Switzerland.—Consul's-office, 24A, Cateaton-street
Turkey.—Consulate, 1, Bryanstone-sq.
Tuscany.—Consul's-office, 15, Angel-ct.
Wurtemberg.—106, Fenchurch-street

COURTS OF LAW.

England.

COURT OF CHANCERY.

Lord High Chan.—Rt. Hon. Lord Cottenham
Chief Sec.—C. Romilly
Sec. of Bankrupts.—W. Vizard
Mast. of Rolls.—Lord Langdale
Chief Sec.—G. W. Sanders
Vice-Chan. of England.—Rt. Hon. Sir L. Shadwell
Vice-Chans.—Right Hon. Sir J. L. Kt. Bruce; Right Hon. Sir J. Wigram
Ac.-Gen.—W. Russell

QUEEN'S BENCH.

Lord Chief Justice.—Lord Campbell
Judges.—Sir J. Patteson; Sir J. T. Coleridge; Sir W. Wightman; and Sir W. Erle

COMMON PLEAS.

Lord Chief Justice.—Right Hon. Sir T. Wilde
Judges.—Sir W. H. Maule; Sir C. Cresswell; Sir V. Williams; and Sir T. N. Talfourd

EXCHEQUER.

Lord Chief Baron.—Right Hon. Sir F. Pollock
Barons.—Right Hon. Sir J. Parke; Sir E. H. Alderson; Sir R. M. Rolfe; Sir T. J. Platt.
Cursitor Baron.—G. Bankes

LAW OFFICERS.

Att.-Gen.—Sir J. Jervis, M.P.
Sol.-Gen.—Sir J. Romilly, M.P.

COURT OF BANKRUPTCY.

Chief Judge.—Vice-Chan. Bruce
Chief Regist.—Mr. Serj. E. Lawes
Commissioners.—J. Evans; J. S. M. Fonblanque; R. G. C. Fane; E. Holroyd; Mr. Serj. Goulburn; H. J. Shepherd

INSOLVENT DEBTORS' COURT.

Chief Commis.—H. R. Reynolds
Commissioners.—J. G. Harris; W. J. Law; and C. Phillips

Ireland.

COURT OF CHANCERY.

Lord Chan.—Rt. Hon. M. Brady
Sec.—F. W. Brady
Mast. of Rolls.—Rt. Hon. T. B. Smith

COURT OF QUEEN'S BENCH.

Lord Chief Just.—Rt.Hon.F.Blackburne
Judges.—Hon. P. C. Crampton; Right Hon. L. Perrin; Rt. Hon. R. Moore

COURT OF COMMON PLEAS.

Lord Chief Justice.—Rt. Hon. J. Doherty
Judges.—R. Torrens; Rt. Hon. N. Ball; J. D. Jackson

COURT OF EXCHEQUER.

Lord Chief Baron.—Right Hon. D. R. Pigot
Barons.—R. Pennefather; Rt. Hon. J. Richards; Right Hon. T. Lefroy

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Freeman, J. 15, Old Jewry-chambers
Gandell, J. 11, Clement's-lane
Garden & Mackendrew. 27, Queen-street, City
Gilmour, D. St. Ann's-wharf, Earl-st., Blackfriars
Glasscott, F. T. 20, Brownlow-street, Drury-lane
Goddard, L. 220, Wapping.
Graham, W., & Sons. Trig-lane, Upper-Thames-street
Grazebrook, J.W. Bull-whf., Queenhithe
Guest, Sir J., & Co. 42, Lothbury
Hall, H. 33, Abchurch-lane, City
Handasyde, W., & Co. 57, Cannon-st., City, and Emerson-street, Bankside
Harratt, C. 2, Royal Exchange-bldgs.
Hawks & Crawshay. 23, Upper Thames-street
Heath, J. M. 2, Winchester-buildings
Hitchcock, G. C. 2, Crosby-square, and Lloyd's
Hogarth, J. Hartley's-whf., Horsleydn.
Hood, T.&C. 18, Earl-street, Blackfriars
Hoole & Lockyer. 21, St. James's-walk, and 1, Suffolk-st., Clerkenwell
Johnson, Cammell, & Co. 19, Great George-street, Westminster
Jones, G. 27, Old Fish-street
Jones, J. 6, Bankside, Southwark, and Iron Bridge-wharf
Kelly, M. 31, Bankside
Kennard, R. W., & Co. 67, Upper Thames-street
Leadbetter & Moore. 5, Railway-place
Linley, T. 4, Carter-st., Walworth-rd.
London Vulcan Iron Works, St. Ann's-wharf, Blackfriars
Malins & Rawlinsons. 3, Mansion-house-place, and Millwall, Poplar
Mann, A. 28, Gloucester-terrace, Vauxhall-bridge-road
Manuel, E. 80, Cowcross-street
Mathews, W. B. 9, Crooked-lane, and 28, Martin's-lane, City
McLaren, Andrew, & Co. 14, 15, 19, 20, Steel-yard, Upper Thames-street
Morewood & Rogers (galvanized). 9, Steel-yard, 86, Upper Thames-street
Mortimer, H. H., & Co. 10 and 25, Great Bush-lane
Moser, Son, & Co. 165, Borough High-street
Moss, H., & Co. 3, Church-ct., Clement's-lane
Pace, Nephew, & Co. 3, Sherbourne-la.
Pfeil, A. L., & Co. 5 & 6, Broad-street, Bloomsbury
Pickering, T. 44, Narrow-st., Limeho.
Plumley, P. 42, New Park-st., Borough, and 5, Bankside
Pooley, A. G. 23, Billiter-street
Porter, J. Bridge-street, Southwark
Porter, J. H. 3, Mansion-house-street
Preller, C. A. 31, Abchurch-lane
Reid, A. 14, Fish-street-hill
Richards, T. S. & Co. 117 and 118, Bishopsgate Within, and at Birmingham
Rodman, S. 10, Vauxhall-bridge-road
Russell, J., & Co. 69, Up. Thames-st.
Sharpe, R. 22, Dowgate-hill
Smart, C. Phœnix-foundry, Coldbath-fields, and 369, Oxford-street
Smith, J. 29, Broad-street, Lambeth
Stainton, H. Carron Company, 15, Up. Thames-street
Starbuck, E. F. 2, Walbrook
Starling, W. D. 13, Change-alley
Stephenson, C., & Co. (hoop). 61, Gracechurch-street
Stunt, G. 11, Holland-st., Blackfriars-rd.
Swift, A. H. 21, Crosby-hall-chambers
Thompson & Co. Dyer's-hall-wharf, Upper Thames-street
Tiddeman & Co. Purfleet-wharf, Earl-street, Blackfriars
Tillet, G. 67, Hatton-garden
Treggon & Co. 22, Jewin-street, and 57, Gracechurch-street
Tuck, J. H. 22, Pall-mall
Tyler, Hayward, & Co. 85, Upper Whitecross-street
Tyrrell, R. Deptford-pier
Walker, G. 5, Pinners'-hall, Great Winchester-street
Walker, J. 52, Alfred-street, City-road
Walker & Holland. 121, Leadenhall-street, and Grange-road, Bermondsey
Walmsley & Co. 3, Upper Thames-st.
White, Lynch, & Co. 66, Bankside
Wilkie, G. 9, Steelyard, Up-Thames-st.
Williams, W. 10, Upper Thames-street
Wilson, W. G. St. Ann's-wharf, Earl-street, Blackfriars
Winter & Rich. 1, Bank-end, Park-st., and 7 & 8, Bankside

Woolcot, J. 6, Great Winchester-st.
Wright, E. 61, Wapping High-street
Wyatt, J. 2, Weymouth-place, New Kent-road

LIBRARIES.

Antiquarian Society. Somerset-house
Beaumont Philosophical Instit. Beaumont-square
Botanical Society. 20, Bedford-street
British Museum. Montague-place
Cadogan Institution. Sloane-street
Charterhouse. Charterhouse-square
Chelsea Hospital
City Library. Guildhall
Church Missionary College. 12, Barnsbury-place
City of London Inst. 165, Aldersgate-st.
Clockmakers' Co. King's-head, Poultry
College of Advocates, Doctors'-coms.
College of Civil Engineers. Putney
College of Physicians. 13, Pall-mall East
College of Surgeons. 40, Lincoln's-inn-fields
Congregational Library. 4, Blomfield-st.
Crosby Hall. Lit. and Scien. Inst. 32, Bishopsgate Within
Dutch Church. Austinfriars (MSS.).
Eastern Lit. and Scien. Inst. Commercial-road
Eastern Lit. and Scienc. Inst. 88, Hackney-road
East-India House. Leadenhall-street
Geological Society. Somerset-house
Gray's-inn. South-square, Gray's-inn
Greenwich Hospital. Greenwich
Greenwich Institution. Greenwich
Guy's Hospital. St. Thomas's-st., Boro'
Hammersmith Instit. Hammersmith
Hebrew College. Duke's-place, Aldgate
Herald's Coll. Bennett's-hill, Doctors'-commons
Highbury College. Higbury-park-house
Homerton College. Homerton
House of Lords. Westminster
House of Commons. Westminster
Incorporated Law Society. 106, Chancery-lane
Inner Temple. 3, Tanfield-ct., Temple
Institution of Civil Engineers. 25, Great George-street, Westminster
Islington Lit. and Sci. Inst. Wellington-street, Upper-street
King's College. Somerset-house
Lambeth Palace. Lambeth
Lincoln's Inn New Hall. Lincoln's-inn
Linnæan Society. 32, Soho-square
London Library, 12, St. James's-sq.
London Institut. 11 & 12, Finsbury-circ.
London Mechanics' Inst. 29, Southampton-buildings
Marylebone Institution. 17, Edwards-street, Portman-square
Mathematical Soc. Church-st., Sptlflds
Medical Society. 3, Bolt-court, Fleet-st.
Merchant Taylors' School. 6, Suffolk-ln.
Middle Temple. Garden-court, Temple
Poplar Institution. East-India-road
Royal Academy of Arts. Trafalgar-sq.
Royal Agricultural Soc. 12, Hanover-sq.
Royal Asiatic Society. 14, Grafton-st.
Royal Astronomical Soc. Somerset-ho.
Royal Geographical Soc. 3, Waterloo-pl.
Royal Institute of British Architects. 16, Grosvenor-street
Royal Institution. 21, Albemarle-street
Royal Observatory. Greenwich
Royal Polytechnic Asso. 5, Cavendish-sq.
Royal Kensington Lit. and Sci. Inst. Kensington
Royal Medical Society. 53, Berners-st.
Royal Society. Somerset-house
Royal Soc. of Literature. 4, St. Martin's-pl.
Russell Institution. 55, Great Coram-st.
St. Bartholomew's Hospital. Smithfield
St. Martin's. 42, Castle-st., Leicester-sq.
St. Paul's. St. Paul's Cathedral
Soane Museum. 13, Lincoln's-inn-fields
Society of Arts. 19, John-street, Adelphi
Southwark Lt. Inst. Portland-place, Borough-road
Statistical Society. 12, St. James's-sq.
Stepney College. Stepney
United Service Inst. Mid. Scotland-yd.
University College. Gower-street
Veterinary Coll. College-st., Camden-tn.
Welsh School. Gray's-inn-road
Western Lit. Inst. 47, Leicester-square
Westminster. Westminster Abbey
Westminster Lit. and Sci. Inst. 6, Great Smith-street
Woolwich Institution. Woolwich
Zoological Society. 57, Pall-mall

MECHANICAL ENGINEERS.

Barlow & Co. 32, Bucklersbury
Bennett, J. 107, Kingsland-road
Bissell, Mrs. A. 106, Up. East Smithfield
Blyth, J. & A. 9, Fore-street, Limeho.
Botten, C. 23, Farringdon-street
Butler. 4, Oxford-street
Chicken & Stewart. 3, Russell-street, Blackwall
Christy & Co. Rotherhithe-street
Clark & Co. 238, Wapping
Collinge & Co. 64, Bridge-rd., Lambeth
Cottam & Hallam. 2, Winsley-street; 76, Oxford-street
Deeley, G. East Buckle-st., Whitechapel
Fox & Co. 8, New-st., Spring-gardens
Frasi, G. 158, Goswell-street
German & Co. Bow-common
Grissell, H. & M. D. 1, Eagle-wharf, Hoxton
Hall, J. & E. 23, Lombard-street
Hodge, S. Oak-lane, Limehouse
Horne, J. 14, Whitechapel High-street
Massie, A. Brewhouse-lane
Medhurst, T. 1, Denmark-street, Soho
Morton, R. 240, Wapping
Neilson, W., & Co. 15, Wharf-rd., City-rd.
Pontifex & Co. Shoe-lane

Pope, W., & Son. 80 and 81, Edgeware-road, Marylebone
Ramsden, R. 100, Kingsland-road
Ransome & Co. 2, Upper Charles-st., Westminster
Rennie, G. & Sir J. 6, Holland-street, Blackfriars
Rich, C. 10, Palace-row, New-road
Robinson, C., & Son. Pimlico-road
Samuda, Brothers. Orchard-pl.,Blackw.
Shears, J., & Sons. 27, Bankside
Simpson & Co. Belgrave-road, Pimlico
Smith, W. Princes-st., Leicester-sq.
Telfer, A. 75, Market-st., Edgware-rd.
Thompson, G., & Sons. Eccleston-street East
Worssam, S. 11, New Manor-st., Chelsea
Yates, W. T. 1, John-st., Cambridge-hth.

METAL BROKERS.

Anichini, P., sen. 5, Langbourn-chamb.
Cotton & Truman. 1, Royal Exchange-buildings
Daniels, M. 50, Threadneedle-street
French & Smith. 14, St. Benet's-place
Frisby, H. R., & Co. 21, Tokenhouse-yd.
Hall & Son. 6, Circus, Minories
James & Shakespeare. 10, Austin-friars
Kirkmann, Brown, & Co. 2, St. Dunstan's-hill
Moate, C. R. 65, Old Broad-street, City
Moser, J. L. Baltic Coffee-house
Protheroe, J., jun. 1, St. Michael's-alley
Richards, J. 12, George-yd., Lombard-street
Short, W. 1, Newman's-court, Cornhill
Swann, W. 14, Pinner's-hall, Old Broad-street
Von Dadelszen, G. M. 27, Mincing-la.
Whitcomb & Barton. 75, Old Broad-street, City

METAL WAREHOUSES.

Aston, Griffiths, & Co. 11, Mark-lane
Bird, W. 37, Basinghall-street
Cohen, H. 5, Windsor-st., Bishopsgate
Dace, W. 136, John-street, Clerkenwell
Farwig, W. 26, Upper Thames-street
Foster, D. G. 23 & 24, St. John's-sq.
Glascott, T. T. 20, Brownlow-street
Hedgcock, J. F. 14, Little Compton-st.
Hoole, W. 21, St. James's-walk, Clerkenwell, and 1, Suffolk-street
Hughes, M. 107, Shoe-lane, Fleet-st.
Jackson, W. 59, Crown-street
Page, George. 27, Goswell-street
Read, J. (*gun*). 30, Brownlow-street, Long-acre
Stanton, Brs. (*tube*). 73, Shoe-lane
Twells, P. M. 2, Brownlow-street
Walker, E., & Son. 55, Red Lion-street, Clerkenwell
Young, Dawson, & Co. 98, Gracechurch-street, and Emmett-street, Poplar

MINERALOGISTS.

Heuland, H. 31, Red Lion-square
Rogers, H. 9, Bell-yd., and 64, Carey-st.
Tennant, J. 149, Strand

MINING COMPANIES.

Alten Mining Association (Edward J. Cole, secretary). 2, Old Broad-street
Alfred Consols Mining Company (R. Thomas, secretary). 8, George-yard, Lombard-street
Anglo-Mexican Mining Association. 5, Broad-street-buildings
Anglo-Mexican Mining Company (G. B. Lonsdale, sec.). 5, Broad-street, bldgs.
Antimony and Silver Lead Mining and Smelting Company (T. Bartlett, manager). 58, Lombard-street
Asturian Mining Company (K. Mackenzie, secretary). 9, Austin-friars
Australian Mining Company. 2, Adelaide-place, London-bridge
Camborne Consols Mining Company (H. L. I. Von Uster, sec.). Bridge-st., Blackfriars
Carn Brea Mines Office (G. Meagle, clerk). 7, Queen-street-place, Upper Thames-street
Carwinning Hill Mining Office (J. A. Tulins, secretary). Lombard-street-chambers, 33, Clement's-lane
Copiapo Mining Company (F. Grellet, secretary). 22, Austin-friars
Copper Mining Company (W. Tate, accountant). 5, Warnford-court, Throgmorton-street
Copper Mining Office (T. Curry). 3, Bond-court, Walbrook
Cornwall New Mining Company (G. Lockwood, sec.). 17, Essex-st., Strand
Cubert Silver Lead Mining Company (R. Thomas, secretary). 8, George-yard, Lombard-street
Cwm-Ystwith Mines Company (John Taylor, jun., manager). 6, Queen-street-place, Upper Thames-street
Derwent Mines Company. 9, Austinfrs.
Derwent Mines Company (John Taylor, jun., manager). 6, Queen-street-place, Upper Thames-street
Devonshire Great Consolidated Copper Mining Company (A. Allen, secretary). 16 & 17, Barge-yd.-chamb. Bucklersb.
Gaspè Fishery and Coal Mining Company (F. Dyken, secretary). 2, New Broad-street, City
General Mining Association (J. B. Foord, sec.). 52, Old Broad-st., City
General Mining Offices (W. H. Smith & H. W. Coates, secs.). 1, Copthall-chmb.
German Mining Company (T. Hacket, secretary). 26, Birchin-lane
Great Polgooth Mining Office (T. A. Corlett, sec.). 38, New Broad-street
Guadalcanal Silver Mining Association (H. Ryde, sec.). 34, Broad-st.-build.

Halkin Mining Company (J. Brand, sec.). 23, King-street, St. James's
Hibernian Mining Company. 6, Austin-friars
Holmbush Copper Mining Company (R. Thomas, secretary). 8, George-yard, Lombard-street
Holyford Copper Mining Company (J. W. Buckland, jun., secretary). 35, Great Winchester-street
Imperial Brazilian Mining Association. 52, Old Broad-street, City
Keswick Mining Company (W. Brown, secretary). 8, Walbrook
Kinzigthal Mining Association (G. C. Capper, secretary). 1, Adelaide-place, London-bridge
Minas Geraes Mining Company (G. D. Keogh, sec.). 8, Tokenhouse-yard
Mines Royal Copper Company (B. J. Spedding, secretary). Golden Hart-wharf, Dowgate, Up. Thames-street
National Brazilian Mining Association (Mocaübas & Cocäes). 26, Throgmorton-street
Penycefn and Lletenhen Silver Lead Mining Company (H. L. T. Von Uster, manager). Bridge-street, Blackfriars
Real del Monte Mining Company (J. Phillips, sec.). 6, Queen-st.-pl., City
Royal Mines of Cobre Association (W. Leckie, secretary). 26, Austin.friars
Royal Santiago Mining Company. 38, Broad-street-buildings
St. John del Rey Mining Company (Wm. Routh, sec.). 8, Tokenhouse-yd.
Treleigh Consolidated Copper Mines. 57, Old Broad-street, City
United Mexican Mining Office (J. Mather, sec.). 5, Finsbury-crescent
Venton Gimps Mining Company (J. J. Iselin, hon. sec.). 4, Austin-friars
Wellington Mining Company (R. Thomas, sec.). 8, George-yd., Lombard-st.
West Wheal Jewel Mining Association. 57, Old Broad-street, City
Wheal Jane Mining Company (R. Thomas, sec.). 8, George-yd., Lombard-st.
Wheal Lawrence Copper & Lead Mining Company. 2, Winchester-buildings
Wheal Sarah Mining Company (R. Thomas, sec.). 8, George-yd., Lombard-st.
Wheal Tremayne Mining Company (R. Thomas, secretary). 8, George-yard, Lombard-street

MUSEUMS.

Antiquarian Society. Somerset-house
Armourers' Hall. 81, Coleman-street
Artillery Company. City-road
Bank of England. Threadneedle-street
Botanical Society. 20, Bedford-street, Covent-garden
British Museum. Great Russell-street
City Museum. Guildhall
East-India Museum. East-India-house, Leadenhall-street
Economic Geology. Craig's-court
Entomological Society. 17, Old Bond-st.
Geological Society. Somerset-house
Guy's Hospital. St. Thomas's-street, Borough
Institution of Civil Engineers. 25, Great George-street, Westminster
King's College. Somerset-house
Linnæan Society. 32, Soho-square
London Hospital. Whitechapel-road
London Institution. Finsbury-circus
London Mechanics' Institution. 29, Southampton-buildings
Missionary Museum. 8, Bloomfield-st., Finsbury
Ordnance Office. 86, Pall-mall
Royal Asiatic Society. 14, Grafton-st.
Royal Botanical Society of London. Inner-circle, Regent's-park
Royal College of Surgeons. 40, Lincoln's-inn-fields
Royal Institute of British Architects. 16, Grosvenor-street
Royal Institution. 21, Albemarle-street
Royal Society. Somerset-house
St. Bartholomew's Hospital. West Smithfield
St. George's Hospital. Hyde-park-crn.
Sappers' Museum. Woolwich
Saull's Museum. 15, Aldersgate-street
Soane Museum (Geo. Bailey, curator). 13, Lincoln's-inn-fields
Society of Art. 19, John-st., Adelphi
Somerset-house. Navy Department
Tower of London
Trinity-house. Tower-hill
University College. Gower-street
United Service. Whitehall-yard
Veterinary College. College-street, Camden-town
Woolwich Repository. Woolwich
Zoological Society's Museum. Regent's-park

TIN MERCHANTS.

Bolitho, T. & W. 28, Fenchurch-street
Budd, J. & E. L. Paul's-wharf, 25, Up. Thames-street
Daubuz, L. C. & W. 9, New Broad-st., City
Enthoven, J. H. 8, Moorgate-street
Union Tin Smelting Company. 200, Bishopsgate-street
Williams, Harvey, & Co. 68, Upper Thames-street

MISCELLANEOUS COMPANIES.

Australian Agricultural Company (G. Engstrom, secretary). 12, King's Arms-yard
Australian Trust Company. 48, Moorgate-street

British Agricultural Company (J. Robinson). Northumberland-al., Fenchurch-street
British American Land Company (T. R. Exham). 35½, New Broad-street, City
British West-India Company (J. Innes). 61, Moorgate-street
Canada Company (J. Perry). 13, St. Helen's-place
Coal Factors' Committee (G. B. Robinson). Coal Exchange
Compressed Air Engine Company. 88, St. James's-street
Deal Pier Company (H. Jackson). 15, St. Helen's-place
Desiccating Company Patent (A. Jennings). 28, New Broad-street
Dhobah Company (R. Gardner). 46, Lime-street
Eastland Company (Thomas Cope). 25, Birchin-lane
Electric Printing Telegraph Office (J. Brett). 29, Parliament-street
Electric Telegraph Company (W. H. Hatcher). 64, Moorgate-street
Equivalent Company (T. G. Smith). 7, Dowgate-hill
Fire Protective & General Building Improvement Company (W. F. Bray). 9, Lincoln's-inn-fields
General Wood-cutting Company (J. M. Douglas). Belvedere-road, Lambeth
Gutta Percha Company (E. Granville). 11, East-India-chambers
Hudson's Bay Company (A. Barclay). 4, Fenchurch-street
Hungerford Market Company (A. L. Leith). 9, Villiers-street, Strand
Irish Land Investment Company (R. Taylor & Co.). 29, Birchin-lane
Irish Waste Land Improvement Society (F. Fry). 5, St. Mildred's-court
London Sewage Company (A. Martin). 4, New London-street
Lough Corrib Commission (J. Barwise). 18, Austin-friars
Lough Neagh Commission (J. Barwise). 18, Austin-friars
Metrop. Buildings Office. 6, Adelphi-tr.
Mexican Company (J. M. Maude). 32, Great Winchester-street
Mexican & South American Company (H. W. Schneider). 10, New Broad-street-mews
New Brunswick & Novia Scotia Land Company, 5, Copthall-court
New England Company (J. Fuller). 9, Great St. Helen's
New London Corn Exchange Company (W. W. Wren). Mark-lane
New Zealand Company (T. C. Harrington). 9, Broad-street-buildings
Norwich Union Reversionary Interest Company (H. Norris). 23, Lincoln's-inn-fields
Old Corn Market Company (T. Levick). Mark-lane
Patent Oropholithe Company (P. F. Page & Son). 14, King's-rd., Bedford-row
Prosser's Patent Railway Guide Wheel Company (G. Hadley). 36, New Broad-street
River Dee Company (B. Lyon). 9, Mansion-house-street
River Fergus Drainage & Embankment (J. Barwise). 18, Austin-friars
Road and Street Cleansing Company (J. Whitworth & Co.). Millbank-street, Westminster
Russia Company (T. Cope). 25, Birchin-lane
Shetland Fishery Company (A. Anderson). 15, St Mary-axe
South Australian Company (D. M'Laren). 4, New Broad-street, City
South Sea Company (C. F. Gibson). South Sea-house, Threadneedle-st.
Thames Tunnel Company (J. B. Blundell). 5, Tunnel-road; and Works, 332, Rotherhithe-street
Tidal Wheel Company, Patent (F. Bennett). 1, Walbrook-bldgs., Walbrook
Tirhoot Company (W. C. Laurie). 6, Gt. Winchester-street, City
Union Wine Company (G. Bishop). 32, Great St. Helen's
Universal Salvage Company. 12, Old Jewry-ch.
Van Diemen's Land Company (G. H. Howell). 6, Gt. Winchester-st., City
Western Australian Land Company (B. Roller). 33, Old Broad-street, City

MINE BROKERS.

Bawden, J. Bank-chambers
Crofts, J. 4, King-street
Herron, J. 33, Clement's-la., Lomb.-st.
Lane, J. 80, Old Broad-street
Rye, H. B. 77, Old Broad-street
Stride, J. 27, Spring-gardens
Thomas, R. 8, George-yd., Lombard-st.
Thomas, T. P. 3, George-yd., Lombard-st.
Tredinneck, R. 3, King's-ct., Lombard-st.
Trenery, W. jun. St. Michael's-al. Cornhl.
Tripp, R. 3, St. Michael's-al., Cornh.
Watson & Cuell. 1, St. Michael's-al. Crnhl.

BRITISH MINING COMPANIES.

Name.	Sec. or Purser.	Office.
Abergwessin Mining Company.. ..	P. P. Couch ..	Nantybrian-house.
Alfred Consols Mining Company ..	H. Thomas.. ..	8, George-yd.,Lombard-st.
Antimony and Silver Lead Mining Co.	T. Bartlett	58, Lombard-street.
Ashburton and United Mining Company	W. Murray.. ..	2, R. Exchange-bds.
Balleswidden Mining Company.. ..	R. N. Davis ..	Mine.
Balnoon Consols Mining Company ..	J. Roscolla.. ..	Mine.
Barristown Mining Company	T. Hacket	26, Birchin-lane.
Bedfont United Mines	G. Kieckhoefer ..	50, Threadneedle-st.
Birch Tor Tin Mine	—	Plymouth.
Blaenavon Iron Company	J Booth	4, Pancras-lane.
Bodmin Consols	W. Murray.. ..	2, R. Exchange-bds.
Botallack Mine Company	J. H. James ..	Penzance.
Brewer Mine	G. Simmons ..	Truro.
British Iron Company	J. Smith	South Sea-house.
Budnick Consols Mine	E. Mitchell.. ..	Truro.
Callington Mining Company	P. Stainsby.. ..	200, Bishopsgate-st.
Camborne Consols Mining Company ..	H. L. T. von Uster	Bridge-street.
Cameron Steam Coal Company ..	A. C. Howden ..	2, Moorgate-street.
Caradon Copper Mine Company ..	P. Clymo, jun. ..	Liskeard.
Caradon Mine Company	S. Seccombe ..	Liskeard.
Caradon United Mining Company ..	W. D. Boase ..	Liskeard.
Caradon Wheal Hooper		
Carn Brea Mining Company	G. Meagle, Clerk ..	7, Queen-st.-place, Up.Thames-st.
Carthew Consols Mining Company ..	W. Shearman ..	Manchester.
Charlestown Mining Company	Jno. Taylor ..	6, Queen-st.-place.
Comb Lawn Mining Company	J. Crofts	4,King-st.,Cheapsd.
Comfort Mining Company	S. & R. Davey ..	Redruth.
Condurrow Mining Company	N. Vivian	Camborne.
Cook's Kitchen Mining Company ..	R. H. Pike	Redruth.
Combe Valley Quarry	C. S. Richardson ..	5, Whitefriars-st.
Cornish Mining Company	Geo. Owens ..	Monument-chmbrs.
Cornwall New Mining Company ..	G. Lockwood ..	17,Essex-st.,Strand.
Copper Bottom Mining Company ..	—	Camborne.
Cradock Moor Mining Company ..	E. A. Crouch ..	Liskeard.
Cwm Erfin Mining Company	T. P. Thomas ..	3, George-yard.
Cwm Ystwith Mining Company ..	J.Taylor, jun., Man.	6, Queen-st.-place.
Dean Prior and Buckfastleigh Min.Com.	C. Bourdillon ..	25, Fleet-street.
Derwent Mining Company	B. O'Connor ..	6, Queen-st.-place.
Devon and Courtenay ConsolsMin.Com.	W. Rendle	Plymouth.
Devonshire Great Consols Mining Com.	A. Allen	Barge-yd. Bucklrsb.
Dolcoath Mining Company	Com.Adventurers..	Camborne.
Drake Walls Mining Company	P. Stainsby.. ..	200, Bishopsgate-st.
Durham County Coal Company ..	W. Brogden ..	Stockton.
Dyfngwm Mining Company	G. Hadley	8, Old Jewry.
East Birch Tor Mining Company ..	A. Redwin	8, Old Jewry.
East Caradon Mining Company ..	Capt. Clymo ..	Liskeard.
East Crowndale Mining Company ..	E. J. Cole	2, New Broad-st.
East Pool Mining Company	Com.ofManagemnt.	Camborne.
East Tamar Consols Mining Company	G. Kieckhoefer ..	50, Threadneedle-st.
East Wheal Crofty Mining Company ..	Adventurers ..	Mine, Camborne.
East Wheal George	H. English	25, Fleet-street.
East Wheal Rose Mining Company ..	E. Mitchell ..	Truro.
East Wheal Seton	Capt. Evans ..	Mine.
Esgair Lle Mining Company	T. P. Thomas ..	3, George-yard.
Exmoor Wheal Eliza Mining Company	J. H. Hitchens ..	Exeter.
Fowey Consols Mining Company ..	W.Davis,Capt. R.M.	Fowey.
General Mining Company for Ireland..	T. Macguire ..	2, Burgh-quay,Dub-

Name.	Sec. or Purser.	Office.
Gonamena Mining Company	E. A. Crouch ..	Liskeard.
Great Consols Mining Company ..	Com.of Managemnt.	Gwennap.
Great Polgooth	T. A. Corbett ..	38, New Broad-st.
Great Wheal Rough Tor Consols Mg. C.	W. A. Thomas ..	50, Threadneedle-st.
Growa Slate Company	W. W. Mansell ..	57, Threadneedle-st.
Gwinear Consols Mining Company ..	R. R. Mitchell ..	3, King's-court.
Halkin Mining Company..	J. Brand	23, King-st.St.James
Heingston Down Consolidated Min. Co.	G. Kieckhoefer ..	50, Threadneedle-st.
Herodsfoot Mining Company	J. Wolfarton ..	Beeralston.
Hibernian Mining Company	W. H. Porter ..	6, Austin-friars.
Holmbush Mining Company	R. Thomas.. ..	8, George-yard.
Holyford Copper Mines	J. W. Buckland ..	34, GtWinchester-st.
Keswick Mining Company	John Watson ..	3, George-yard.
Kingsett and Bedford Mining Company	J. Tirnewell ..	Exeter.
Kirkcudbrightshire Mining Company ..	T. Hacket	26, Birchin-lane.
Lamerhooe Wheal Maria Mining Com.	J. Crofts	4, King-street.
Lanarth Consols Mining Company ..	W. Richards ..	Penzance.
Lelant Consols Mining Company ..		
Levant Mining Company..	W. Dunbury ..	Truro.
Lewes Mining Company	P. Stainsby.. ..	200, Bishopsgate-st.
Llwyn Malies Mining Company ..	J. Maitland ..	12, Copthall-court.
Llynvi Iron Company	F. W. Gibbon ..	15, Old Jewry-chmb.
Lostwithiel Consols Mining Company..	J. Crofts	4, King-street.
Marke Valley Mining Company ..	Capt. Seccombe ..	Linkinhorne.
Mendip Hills Mining Company ..	P. Stainsby ..	200, Bishopsgate-st.
Metha Mining Company	Bullock &Luscombe	Lincoln's-inn.
Mining Company of Ireland	R. Pursly	Low.-Orm.-qy.Dub.
Mordirtonham Consols..	J. Nicholson ..	90, New Bond-st.
New East Crowndale Mining Company		
North Pool Mining Company	H. Borrow	Truro.
North Roskear Mining Company ..	— Hutchinson ..	Camborne.
North Wheal Leisure Mining Company		
North Wheal Basset	R. Lyle	34, GtWinchester-st.
Par Consols Mining Company	W.Davis, Capt.R.M.	Fowey.
Pennant and Craigwen Mining Company	W. W. Mansell ..	57, Threadneedle-st.
Penrhw Mining Company		
Peny-Cefn Lletenhen Mines	H. L. T. Von Uster	Bridge-street.
Penzance Consols Mining Company ..	J. Carthew.. ..	St. Just.
Plymouth Wheal Yeoland Mining Com.	—	Jump.
Polsaith Consols Mining Company ..	R. Taylor	St. Cleer.
Rhoswiddol and Bacheldon Mining Co.	G. Hadley	8, Old Jewry.
Rhymney Iron Company	T. E. Scudamore ..	Lawrence Pountney-[hill.
Rosewell Hill Mining Company ..		
Runnaford Combe Tin Mining Compny.	R. Manuel	Woolwich.
South Tamar Consols Mining Company	G. Kieckhoefer ..	50, Threadneedle-st.
South Caradon Mining Company ..	T. Kittow	Liskeard.
South Dolcoath Mining Company ..	P. Stainsby ..	200, Bishopsgate-st.
South Friendship Wheal Ann Min.Com.	— Cudlipp	Tavistock.
South Molton Mining Company ..	J. Clymo	Liskeard.
South Plain Wood	J. Nicholson ..	90, New Bond-st.
South Tolgus Mining Company ..	J. Taylor	6, Queen-st.-place.
South Trelawney Mining Company ..	T. Hackett ..	26, Birchin-lane.
South Wales Mining Company	T. P. Thomas ..	3, George-yard.
South Wheal Bassett Mining Company	W. Richards ..	Redruth.
South Wheal Josiah Mining Company	J. Hambly	Calstock.
South Wheal Maria Mining Company..	—	Tavistock.
Southern and Western Irish Min. Com.	W. Connell ..	South Mall, Cork.
Spearne Moor Mining Company ..	—	Balleswidden.
St. Anstell Consols Mining Company ..	— Hodge	St. Anstell.
St. Michael Penkwel	— Lowry	Truro.
St. Minver Consols Mining Company..	—	Padstow.
Stray Park Mining Company	W. Vawdrey ..	Penwll Hoyle.

Name.	Sec. or Purser.	Office.
Tamar Consols Mining Company ..	P. Stainsby.. ..	200, Bishopsgate-st.
Tavy Consols Mining Company ..	P. Fisher	Plymouth.
Tincroft Mining Company	P. Stainsby.. ..	200, Bishopsgate-st.
Tin Vale Mining Company	W. W. Mansell ..	57, Threadneedle-st.
Tollorgoch	— Jones	Rill, Flintshire.
Tregordan Mining Company	J. Philp	Liskeard.
Trehane Mining Company	J. Philp	Liskeard.
Treleigh Consols Mining Company ..	W. Nicholson ..	57, Old Broad-st.
Trenance Mining Company	T. Watson	12, Cornhill.
Tresavean Mining Company	Thos. Curry ..	Bond-ct., Walbrook
Trethellan Mining Company	Thos. Curry ..	Bond-ct., Walbrook
Treviskey and Barrier Mining Company	J. Williams, jn. & Brs.	Scorrier, Truro.
United Mines Company	J. Taylor	2, Abchurch-lane.
Wellington Mines Company	R. Thomas.. ..	8, George-yard.
West Buller Mining Company	J. & R. Davey ..	Redruth.
West Caradon Mining Company ..	E. A. Crouch ..	Liskeard.
West Fowey Consols Mining Company	W. Davis	Fowey.
West Providence Mining Company ..	R. R. Michell ..	Marazion.
West Seton Mining Company	R. Harvey	St. Day.
West Trethellan Mining Company ..	W. Richards ..	Redruth.
West United Hills Mining Company ..	H. Ellery	Truro.
West Wheal Francis Mining Company	J. Reynolds ..	Camborne.
West Wheal Jewel Mining Company ..	W. Nicholson ..	57, Old Broad-st.
West Wheal Tolgus Mining Company..	W. Richards ..	Redruth.
West Wheal Treasury Mining Company	W. Burgess ..	Camborne.
Wheal Adams Mining Company ..	T. Hackett.. ..	26, Birchin-lane.
Wheal Agar Mining Company	J. MacDonnell ..	Broad-st.-buildings
Wheal Anderton Mining Company ..	J. Carpenter ..	Tavistock.
Wheal Anna Maria Mining Company ..	—	Dunsford, nr. Exeter
Wheal Ash Mining Company	—	Tavistock.
Wheal Bal Mining Company	J. Carthaw.. ..	St. Just. [Manch.
Wheal Barbara	W. Shearman ..	Stamp Office-bildgs.
Wheal Benny Mining Company ..	J. Crofts	4, King-street.
Wheal Blencowe Mining Company ..	J. Dale	Mine.
Wheal Calstock Mining Company ..	—	Calstock.
Wheal Coad Mining Company	—	Lombard-street.
Wheal Comfort	J. R. Davey ..	Redruth.
Wheal Courtenay Mining Company ..	E. Lyne	St. Columb.
Wheal Crebor	J. H. Murchison ..	76, Cornhill.
Wheal Fortescue Mining Company ..	J. Matthews ..	Tavistock.
Wheal Franco Mining Company ..	—	Tavistock.
Wheal Henry Mining Company ..	J. Tippet	Truro.
Wheal Jane	R. Thomas.. ..	8, George-yard.
Wheal Lawrence Mining Company ..	T. A. Readwin ..	2, Winchester-bldgs.
Wheal May	C. S. Richardson ..	15, Old Broad-st.
Wheal Mary Ann Mining Company ..	P. Clymo, jun. ..	Liskeard.
Wheal Mary Consols Mining Company	E. A. Crouch ..	Liskeard.
Wheal Penhale Mining Company ..	W. Shearman ..	Manchester.
Wheal Reeth Consolidated Mines Comp.	—	Albion-st., Leeds.
Wheal Russell	J. H. Hitchens ..	Tavistock.
Wheal Sarah	R. Thomas.. ..	8, George-yard.
Wheal Seton Mining Company ..	T. & H. Tilly ..	Falmouth.
Wheal Sisters Mining Company ..	E. A. Crouch ..	Liskeard.
Wheal Sophia Mining Company ..	J. Bennett	Mine.
Wheal Trehane	J. Philp	Liskeard.
Wheal Trescoll Mining Company ..	C. S. Richardson ..	15, Old Broad-st.
Wheal Trelawney Mining Company ..	J. Bryant	Liskeard.
Wheal Tremayne Mining Company ..	R. Thomas.. ..	8, George-yard.
Wheal Williams Mining Company ..	N. Bassett	Truro.
Wicklow Copper Mines Company ..	J. Barnes	Vale of Ovoca.

FOREIGN MINES.

Name.	Place.	Secretary.	Office.
Alten Mining Company ..	Norway	E. J. Cole	2, New Broad-st.
Asturian Mining Company ..	Spain ..	K. Mackenzie ..	9, Austin-friars.
Australian Mining Company	Australia	— Josephs	2, Adelaide-place.
Anglo-Mexican Mining Assoc.	Mexico	J. Godfrey	5, Broad-st.-bldgs.
Anglo-Mexican Mint Compy.	Mexico	G. B. Lonsdale ..	5, Broad-st.-bldgs.
Barossa Range Mining Comp.	Australia	Coode, Brown, &Co.	13, Bedford-row.
Brazilian Imperial	Brazils..	G.Thomas, Man.Dir.	52, Old Broad-street.
Cobre Copper Mine Company	Cuba ..	W. Leckie	26, Austin-friars.
Copiapo Mining Company ..	Cuba ..	F. Grelliett	22, Austin-friars.
General Mining Association..	No. Scot.	T. B. Frood ..	52, Old Broad-street.
Guadalcanal Mining Company	Spain ..	H. T. Ryde	34, Broad-st.-bldgs.
Kinzigthal Mining Association	Australia	G. C. Capper ..	1, Adelaide-place.
Linares Mining Company ..	Spain ..	J. Eaton	2, Old Broad-street.
Mexican Company	Mexico..	J. M. Maude ..	Gt. Winchester-st.
Mexican & S. American Com.	Mexico	H. W. Schneider ..	10, Nw Broad-st.mws
National Brazilian Mg. Assoc.	Brazils..	J. Kempson, jun. ..	2, New Broad-street.
North British Australasian ..	Australia	Jopp & Shaw ..	Aberdeen.
Real Del Monte Mining Com.	Mexico	J. Phillips	6, Queen-st.-place.
Royal Santiago Mining Assoc.	Cuba ..	— Docker	Broad-st.-buildngs.
Scottish Australian	Australia	Stronach & Grainger	Aberdeen.
St. John del Rey Min. Assoc.	Brazils..	W. Routh	8, Tokenhouse-yard
United Mexican Ming. Assoc.	Mexico	J. Mather	5, Finsbury crescent
Worthing Mining Company..	S. Austrl.	J. H. Murchison ..	70, Cornhill.

GENERAL POSTAL REGULATIONS, &c.

Rates of Postage.—All letters from one part of Great Britain to another (including the Local Penny Posts and the London Twopenny Post) are charged, if pre-paid, and not

Exceeding half an ounce .. .. 1d.
Exceeding half an ounce, and not exceeding one ounce .. 2d.

and so on at the rate of 2d. for every additional ounce or fraction of an ounce. Unpaid and unstamped letters are charged double postage on delivery.

Hours of Posting for the Evening Mails.—The Receiving-houses close at 5 30 p.m.; but letters are received for the evening's despatch until 6 p.m., if an extra penny stamp is affixed. The Branch Post-offices at Charing-cross, Old Cavendish-street, and Stone's-end, Southwark, receive letters until 6 p.m., and until a quarter to 7 p.m., and till 7 by affixing an additional penny stamp. At the Branch Post-office in Lombard-street, the box remains open without additional fee until 6 p.m., and until 7 p.m. by affixing a penny stamp. At the General Post-office, in St. Martin's-le-Grand, until 6, free; and until 7, by payment of the extra charge as at Lombard-street. From 7 to half-past 7 p.m., letters may be posted at the General Post-office upon payment of a fee of 6d. each, which must, as well as the postage, be pre-paid. Letters intended to pass by outward mails to foreign parts must be posted at the above hours.—N.B. Newspapers for the evening mails must be put into the Receiving-houses before 5 p.m., the Branch-offices before 5 30, or General Post-office before 6 p.m. From 6 p.m. to 7 30, on payment of one halfpenny late fee; except newspapers for foreign parts, which must be posted at the General Post-office and Branch-offices before 6 p.m., and at the Receiving-houses before 5 p.m.

Morning Mails are forwarded to most of the principal towns in England and Wales, and to all parts of Ireland and Scotland, for which the letter-boxes at the Receiving-houses will be open till 7 A.M. for newspapers, and a quarter to 8 A.M. for letters; and at the Branch-offices—Charing-cross, Old Cavendish-street, and the Borough—for newspapers until 7 A.M., and for letters until 8 A.M. At the General Post-office and the Branch-office, in Lombard-street, the boxes will close for newspapers at a quarter before 8 A.M., and for letters at half-past 8 A.M.

Any Single Book or Pamphlet can now be sent through the Post-office to any part of the United Kingdom, if not exceeding 16 oz. in weight, and open at both ends, by affixing six postage stamps; if above 16 oz. 1s., and 6d. for every additional pound or fraction of a pound. The Postmaster-General does not guarantee the delivery of books and pamphlets with the same accuracy and regularity as newspapers and letters, but in no case will the delivery be delayed more than twenty-four hours after the usual post.

British and Colonial Papers between British colonies, without passing through the United Kingdom, to be free; except that 1d. may be allowed as a gratuity to the master of the vessel conveying them.

Newspapers, British, Foreign, or Colonial, passing between British or Colonial and Foreign ports, and through the British post, to pay 2d.; if not through the British post, 1d.

New Postage Stamps intended principally for the pre-payment of foreign letters have been issued. They are of the value of 1s. each, the colour being green, and the form octagonal, and another of the value of 10d. of a brown colour. These stamps may be used for inland as well as foreign postage, but they are chiefly intended for the postage of letters to the United States, India, China, the West Indies, New South Wales, and New Zealand, &c.

Packages, which in length, breadth, or width, exceed 24 inches, cannot be forwarded by post between any places within the United Kingdom, except, however, petitions or addresses to her Majesty, or petitions to either House of Parliament forwarded to any member of either house, or printed votes or proceedings of Parliament, or letters to or from any Government offices or departments.

Money Orders.—With a view to simplicity and economy in the accounts of the Money-order-office, it has been found necessary to lay down the following rules:—1. Every money-order issued on or after the 6th October, 1848, must be presented for payment before the end of the second calendar month after that in which it was issued (for instance, if issued in October, it must be presented for payment before the end of December), otherwise a new order will be necessary, for which a second commission must be paid. 2. As already notified to the public, if an order be not presented for payment before the end of the twelfth calendar month after that in which it was issued (for instance, if issued in October and not presented before the end of the next October), the money will not be paid at all. 3. As, after once paying a money-order, by whomsoever presented, the office will not be liable to any further claim, the public are strictly cautioned—*a.* To take all means to prevent the loss of the money-order. *b.* Never to send a money-order in the same letter with the information required on payment thereof. *c.* To be careful, on taking out a money-order, to state correctly the Christian name as well as the surname of the person in whose favour it is to be drawn. *d.* To see that the name, address, and occupation of the person taking out the money-order are correctly known to the person in whose favour it is drawn. 4. Neglect of these instructions will lead to delay and trouble in obtaining payment, and even risk the loss of the money. These instructions, together with some others of minor importance, will be found printed on every money-order.

London District Post-Office.—The principal office is at the General Post-Office, St. Martin's-le-Grand, where letters may be posted one hour later up to 12 o'clock, and three quarters of an hour later at each despatch up to 6 o'clock, than at the receiving-houses. There are *ten* deliveries of letters in London daily.

Newspapers and Printed Papers.—Newspapers are entitled to pass free. They must be put into the receiving-houses before 5 P.M. or 7 A.M.; at the branch post-offices before half-past 5 P.M. or half-past 7 A.M.; or at the General Post-Office, St. Martin's-le-Grand, before 6 P.M., or a quarter before 8 A.M. Newspapers put into the late Newspaper Windows at St. Martin's-le-Grand, from 6 until half-past 7 P.M., with a halfpenny each, will be despatched the same evening. News-

papers for the Colonies and Foreign countries cannot be received after 6. Newspapers to the British Colonies and possessions pass free if posted within seven days after the day of publication (the Cape of Good Hope excepted, there being no regular packet to that place). To other foreign ports the postage on each newspaper is either 1*d.* or 2*d.* Newspapers pass free to France and Belgium, but are charged on delivery with a fee of 4 centimes (nearly one halfpenny). Newspapers from France and Belgium are charged with a fee of one halfpenny on delivery here.

Registration.—This consists in the payment of a fee of 6*d.*, in addition to the ordinary rate of postage, for which a printed acknowledgment is given by the postmaster, and the safe delivery of the letter is guaranteed by the Post-Office. In the case of foreign, colonial, or ship letters, this guarantee only extends to the port of despatch in the United Kingdom—letters addressed to France form an exception. The registration 6*d.* must always be paid *in money*, but the prepayment of postage may be effected in the usual way, by the letter bearing the required number of stamps. Registered letters must be posted half an hour before the ordinary time for closing the box.

Prices Current, when bearing a newspaper stamp and under 2 oz., are subject to the same rates as newspapers; unstamped price currents, such as Lloyd's List, London New Price Current, &c. &c., are charged 1*d.* to any part.

Foreign Mails are made up in London for France, and all places through France, daily, except Sunday.—Hambro' and Holland, Tuesday and Friday.—Flanders, daily, except Sunday.—Spain and Portugal, 7th, 17th, and 27th of each month.—Brazil, &c., first Tuesday in the month.—Mediterranean, Greece, &c., *viâ* Falmouth, Saturday nearest the 15th and last day of each month.—Egypt, China, and Australia, *viâ* Southampton, 3rd and 20th of each month, and 7th and 24th of each month *viâ* Marseilles.—West Indies, 1st and 15th of each month.—Mexico, &c., 1st of each month.—North America, 3rd and 18th of each month.

FOREIGN PACKET RATES OF LETTERS.

BY PACKETS FROM LONDON.

Between the United Kingdom and	Single rate. s.	d.
Prussia, *viâ* Hamburgh and Holland, uniform British and foreign rate, not exceeding ½ oz.	1	0
Ditto, *viâ* Belgium, uniform ditto ditto, under ¼ oz.	1	0
Countries on the Continent of Europe, *viâ* Prussia: Mecklenburg Schwerin, Mecklenburg Strelitz, Oldenburg, and Saxony, uniform ditto ditto, under ¼ oz.	1	3
German States (except Wurtemburg) served by the post-office of Tour and Taxis, ditto ditto	1	4
Poland, ditto ditto	2	1
Russia, ditto ditto	1	7
Sweden, ditto ditto	1	10
Austrian States (by route of Belgium and Holland) ditto ditto	1	8
Austrian Silesia and Gallicia (ditto of Hamburgh) ditto ditto	1	3
All other parts of the Austrian States (ditto) ditto ditto	1	7
Holland, uniform British and foreign rate, not exceeding ½ oz.	1	0
Hanover and Brunswick, ditto	0	9
Denmark, ditto	0	10
Lubeck, ditto	0	9
Hamburgh, ditto	0	8
Bremen, ditto	0	8
Oldenburg, ditto	0	9
Mecklenburg Schwerin, ditto	0	10
*a*Heligoland, uniform rate of	0	6
*a*Cuxhaven, ditto	0	6
*a*Countries on the Continent, *viâ* Holland, ditto	0	8
*a*Java, *viâ* Holland, ditto	1	0

	Single rate. s. d.
*a*Sweden, Norway, and Mecklenburg Strelitz, if addressed *viâ* Hamburgh, and not intended to be forwarded through Prussia—packet rate from London, 1*s.* 8*d.*; inland postage, if not posted or delivered at the port, 2*d.*; total single rate	1 10

BY PACKETS FROM SOUTHAMPTON.

Between the United Kingdom and

	s.	d.
*a*Lisbon	1	3
*a*Spain (by Southampton packet)	2	2
*a*Greece and Egypt (Alexandria excepted)	1	6
*a*Alexandria	1	6
*a*Chili, Peru, and Western Coast of America	2	0
*a*Hayti and the Foreign West India Islands (Cuba excepted)	1	5
*a*New Grenada and Venezuela	1	0
Mexico and Cuba	2	3
Gibraltar	1	0
Malta	1	0
Ionian Islands	1	0
Honduras	1	0
British West Indies (Jamaica and Berbice excepted)	1	0
Kingston, Jamaica	1	0
Aden, *viâ* Southampton	1	0
Ceylon, *viâ* Southampton	1	0
India, *viâ* Southampton	1	0
Hong Kong, *viâ* Southampton	1	0
*a*Madeira, *viâ* Lisbon	1	9
*a*Ditto, by West Indian Packet	1	10
Jamaica, the Packet Port of Kingston excepted, including the internal colonial rate of 2*d.*	1	2
Berbice, ditto	1	2

BY PACKETS FROM DOVER.

Between the United Kingdom and

	s.	d.
Belgium, British and Foreign, under ¼ oz.	1	0
*a*Countries on the Continent of Europe, *viâ* Belgium, uniform British rate, not exceeding ½ oz.	0	8
France and Algeria, British and foreign rate, under ¼ oz.	0	10
Belgium, *viâ* France, ditto	0	10
*a*Spain, Portugal, Sardinia, Tuscany, and Lucca, *viâ* France, ditto	0	10
*a*Prussia, Northern Russia, Belgium, Holland, Two Sicilies, Papal States, Modena, Parma, Placentia, Greece, Archipelago, and Ionian Islands, *viâ* France, uniform British rate, not exceeding ½ oz.	0	5
Bavaria, *viâ* France, ditto	0	5
Austrian dominions and cities of Cracow and Belgrade, *viâ* France, uniform British and foreign rate, under ¼ oz.	1	5
Baden, ditto	0	9
Wurtemburg, ditto	0	10
Switzerland, ditto	0	11
Certain Northern States of Europe, forwarded through the office of Tour and Taxis, *viâ* France, ditto	1	8
Certain States of Germany, served by the office of Tour and Taxis, *viâ* France, ditto	1	3
Wallachia and Moldavia, *viâ* France, ditto	1	9
Turkey in Europe (Belgrade excepted) and Scutari in Asia, *viâ* France, ditto	1	11
Southern Poland (viz. the Governments of Cracow, Lublin, and Sandomier) and Southern Russia, *viâ* France, ditto	1	6
Alexandria, Beyrout, Smyrna, Dardanelles, and Constantinople, by French Packets, *viâ* Marseilles, ditto	1	3
Tuscany and Naples, ditto ditto	1	9
*a*Sardinia and Sicily, ditto ditto	1	3
Roman States, ditto	1	7
Greece, ditto ditto	1	5
Malta, ditto ditto	1	1

	Single rate. s. d.
Malta, monthly closed Mail, *viâ* Marseilles, ditto	1 3
Alexandria, ditto ditto	1 8
*a*India, ditto ditto	1 10
*a*Hong Kong, ditto ditto	1 10
*a*Ionian Islands, ditto ditto	1 8

BY PACKETS FROM LIVERPOOL.

	s. d.
United States, uniform British and foreign rate, not exceeding ½ oz.	1 0
Bermuda and Newfoundland, uniform rate of	1 0
‡Nova Scotia, New Brunswick, and Prince Edward's Island, uniform rate of	1 0
‡Canada, uniform British and foreign rate	1 2

‡ This includes the internal colonial rate of 2*d*. per ½ oz.

BY PACKETS FROM FALMOUTH.

	Packet rate from Falmouth.	Inland postage, if not posted or delivered at the port.	Total single rate.
	s. d.	s. d.	s. d.
*a*Madeira	1 8	0 2	1 10
*a*Brazil	2 7	0 2	2 9
*a*Buenos Ayres	2 5	0 2	2 7

⁎ The postage marked *a* must be paid in advance.

PATRONIZED BY HIS ROYAL HIGHNESS PRINCE ALBERT,

LORD WARDEN OF THE STANNARIES, CHIEF STEWARD OF THE DUCHY OF CORNWALL, DEVON, ETC.

Just published, in Lithograph, and now ready for distribution,

A SYNOPSIS OF THE

CORNWALL TICKETINGS FOR COPPER ORES,

FROM 1800 TO THE PRESENT TIME;

TOGETHER WITH

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Which contains the following information, viz.:—The Standard, Produce, Price, Quantity of Copper Ores sold, Amount of Money realized, and the Quantity of Fine Copper produced; with respective fluctuations for each year, as well as for every six years; exhibiting also the totals and averages for the whole period collectively.

The above information is contained on a large sheet of drawing-paper, on which the Standard in each year is delineated by horizontal lines of various colours, pointing to the particulars thereof; the said lines having a scale affixed to them, for the purpose of showing the continued RISE and FALL annually of the STANDARD.

These SYNOPSES—as is the case with the original—are "Inscribed, by permission, to Joseph Thomas Treffry, Esq., of Place, Fowey, the greatest employer of miners and other labourers in the West of England."

The original sheet was exhibited at the recent meeting of the Royal Cornwall Polytechnic Society at Falmouth, where it was regarded with much interest by gentlemen connected with mining and smelting pursuits. The compilation was awarded with a medal, and was thus favourably noticed in the Judges' Report:—"This paper, in the judgment of the committee, contains a very valuable series of deductions from published ticketing-papers, very conveniently arranged for reference."

The work has been published by subscription, price *7s. 6d.*, or with rollers 10*s.* each, and copies may be obtained by applying to the Compiler, Mr. Wm. Polkinghorne, Fowey Consols Mine, Tywardreath, near St. Austell; or to Mr. John Murch, 34, Cockspur Street, Charing Cross, London.

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"The compiler has used much care and discretion in the getting up of his work, which must prove of great utility to all interested in the copper trade. Being on a handsome sheet, which, hung on rollers, can be suspended like a chart, the merchant and miner is enabled to see at one glance the state of the copper market in this century. The different valuations of the standard are denoted each year by coloured lines,

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"The document is prepared with great neatness, and, we doubt not, with equal accuracy; and, if lithographed, would, we imagine, form a very interesting work of reference for all parties concerned in the mining and smelting operations of the county."—*Royal Cornwall Gazette, September* 28, 1849.

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"We may state that the tables, &c. are got up with great neatness and care, and, we understand, with great exactness."—*West Briton and Cornwall Advertiser, September* 28, 1849.

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